The Dock & Harbour Authority

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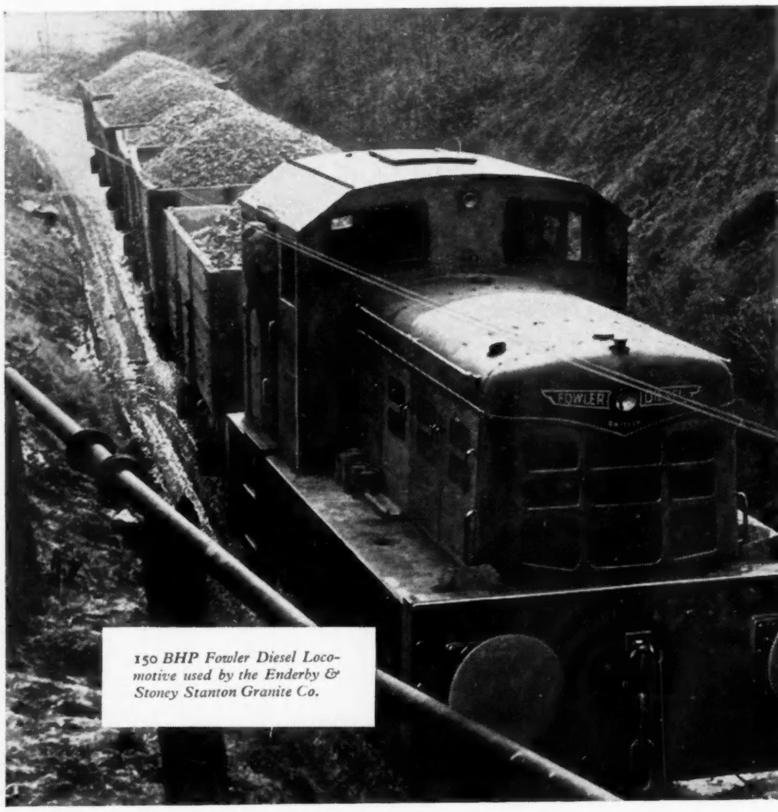

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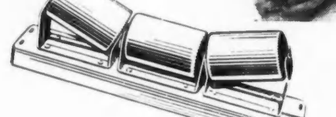

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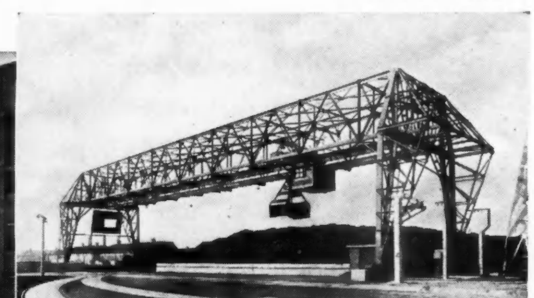

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The Dock & Harbour Authority

An International Journal with a circulation extending to 83 Maritime Countries

No. 410

Vol. XXXV.

DECEMBER, 1954

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Editorial Comments

The Port of Rijeka.

Situated on the Gulf of Kvarner in the Adriatic Sea, the Port of Rijeka (more popularly known as Fuime) has had a turbulent history and during the past 500 years has been under the sovereignty of various states and nations. After many vicissitudes it was, in 1947, finally ceded by Italy to Jugoslavia, since when it has become the principal port of that country.

Rijeka is chiefly important as a transit port, being one of the few maritime outlets of the middle Danubian Basin, though with its adjacent port of Susak it has a considerable coastal trade. The harbour is modern and consists of a number of artificial basins protected by moles, most of which were constructed since 1872. They were, however, devastated by the German armies during the Second World War.

An account of the post-war reconstruction of the port and its ancillary equipment forms the leading article in this issue. Readers will be impressed with the celerity with which the work of rehabilitation has been carried out. The enterprise and initiative displayed by the Port Management, despite shortage of steel and other materials, reflects the greatest credit on all concerned.

With the facilities now available, the annual capacity of the port is about 3 million tons. It can fully meet its own domestic traffic requirements and also the transit traffic requirements of its neighbouring countries. Should the necessity arise, its capacity can easily be increased.

Inland Waterways and B.T.C. Reorganisation Plans.

The British Transport Commission has published details of a reorganisation scheme which will operate from January 1st, 1955. Apart from the reorganisation of the railways and other transport undertakings which do not come within the purview of this Journal, the present Docks and Inland Waterways Management Board is to be replaced by Management Boards for British Transport Docks and British Transport Waterways respectively. Sir Robert Letch has been appointed Chairman and General Manager of the Docks Board. The name for the comparable officer for the Waterways Board had not been announced at the time of going to press.

The full implications of these proposals have not yet been made public and further details will be awaited with interest. The change in policy does, however, give added emphasis to the stimulating article we publish on a following page, concerning the British Canal System, in which the author surveys the past, present and possible future of British Waterways. Whenever this difficult subject is studied objectively, as it has been on many occasions in this Journal, it becomes clear that any consideration of plans for, or possible future organisation of, the canals must be preceded by a decision of policy. This article is no exception.

There are a number of alternative decisions which could be made: each would introduce serious difficulties. To abandon the system entirely—a policy attractive for its apparent simplicity—would in fact be as difficult as it would be deplorable. The contrary policy—to embark on wholesale enlargement—is unlikely to gain support in competition with other demands on capital resources for equivalent purposes; the recent decision of the Government for a road building programme implies that canals are low in the priority list, if they find a place on it at all.

There remains a strong case for a courageous policy of improvement on certain selected routes, accompanied by release to the Waterways Authority from the burden of 800 miles of unremunerative canals. On this last issue, the recent Parliamentary notice of a proposed British Transport Bill contains a clause concerning the abandonment of navigation on certain canals. This would, however, by no means release the Commission from financial obligation for maintenance, even for the limited mileage involved. The major policy decision thus remains unresolved.

Meanwhile, the Board of Survey, appointed some months ago, have not revealed their conclusions, and the canal industry must carry on from day to day with no idea about the future. If the industry were given a mandate, it could prosper and contribute substantially to the needs of the country.

Call For Investigating the Dock Labour Scheme.

It was emphasised in our November issue that much of the unrest in the port industry arose because of the ineffectiveness of the disciplinary machinery incorporated in the National Dock Labour Scheme. Since then, there have been references in many quarters to the fact that the present peace in dockland is an uneasy one and, although most of the comments emphasise that this is because of the serious dispute between two dock labourers' unions, some of them get nearer the root of the trouble by stating that the immediate need is a thorough and impartial examination of the operation of the Scheme.

In our view, this need is an imperative one. In the House of Lords last month Lord Ammon, former Chairman of the National Dock Labour Board, went even further. His request was for an inquiry into the operation of the Scheme and in this he was strongly supported by Lord Waverley, Chairman of the Port of London Authority, and by others with close experience of dock labour problems.

Impartial investigating bodies have inquired into the succession of strikes from which the port industry in this country has suffered since 1945, and on each occasion has described them as wholly unwarranted. Yet, although the machinations of disaffected people within the industry foment small local disputes into large-scale unofficial strikes, and although these people break not only local agreements but also their obligations under the National Scheme, such is the present state of affairs that, even after a succession of disrupting incidents, these same people must be left in the industry to continue their malpractices.

There is no doubt that the port industry has, for too long, been a target for disaffected persons with political motives. So far the Government has been prone to assume a neutral attitude, and if it does not feel it to be its duty to enlighten the public on the personalities and purposes involved in the disputes, surely the National Dock Labour Board should do so.

Prior to decasualisation, men applied for work with the employer they preferred to work for; and the employer, on his part, had an equal right to select the men he needed. This arrangement was unsatisfactory, particularly to the work people, as it meant a

Editorial Comments—*continued*

scramble for work which, even when obtained, offered no security. It did, however, have one advantage—over a period of time the troublemakers became known, and were the last to be employed. Moreover, they could always be paid off if they misbehaved, and consequently many of them were ultimately eliminated from the industry.

Under present arrangements, the malcontent is secure. If not taken on at the "free" call (which still exists), the man is directed to an employer still requiring labour, and the employer must accept him, though frequently knowing that he is a potential source of disruption. Whatever trouble he may make, the kind of disciplinary action that the Scheme permits, and the method by which it must be taken, are ineffective, not only in ridding the industry of such a man, but even in preventing him from repeating his malpractices.

There have already been too many inquiries without subsequent adequate action. It is well known that the technique of these disaffected persons follows a regular pattern, which has been fully described in the Leggett Report of 1950. It is still being employed. The last strike was a strike against what remnants of discipline the Scheme is still able to impose.

As Lord Ammon pointed out, the situation calls for the exercise of courage, authority and direction. In his speech supporting Lord Ammon, Lord Waverley stated that the Scheme had been a daring experiment of a novel character, and that it was not surprising that experience had shown it to contain defects. The Earl of Munster, who replied on behalf of the Government, argued that, because the recent Evershed inquiry omitted to recommend any change in the Scheme, its operation must be satisfactory. In due course, he said, it is the intention of the Minister of Labour to discuss the operation of the Scheme with the industry.

Those directly concerned in operating the ports of this country are practically unanimous that the Scheme should be impartially investigated, particularly as far as its disciplinary clauses are concerned. People holding this firm belief include not only the employers of dock labour—the Port Authorities, the Shipping Companies, the Master Stevedores, the Wharfingers and so on—but also many Union and National Dock Labour Board officials. This need, in fact, has become so apparent and so urgent that it has forced itself to the notice of all the major interests whose business is in any way connected with the ports.

The position is serious and brooks no further delay. If the Minister of Labour is to conduct conversations with the industry, these should begin now. If they are deferred, there is every probability of further trouble at the docks before the necessary improvement in the operation of the National Dock Labour Scheme has been effected.

The Nigerian Ports Authority.

The Nigerian Government has announced the establishment of the Nigerian Ports Authority, a public corporation modelled on the same lines as similar bodies in the United Kingdom. It will be recalled that a statement of policy proposed by the Nigerian Government and reported in the August, 1953, issue of this Journal, dealt with the powers of the Authority. This stated that the Port Authority will take over the statutory duties which up to the present have been imposed on the Marine Department as Harbour Authority, Lighthouse Authority and Pilotage Authority in Nigeria and the Cameroons. In addition, it will assume the responsibility for licensing water-frontages in so far as those duties rest at present with the Marine Department. Similarly, the Authority will take over the duties of the Railways, Customs, and Public Works Department where they concern the operation, administration and maintenance of wharves transferred to it.

It is hoped to vest the authority next year; in the meantime, it has been given power to control most of the operations for which it will ultimately assume full responsibility. Although these powers will cover all the ports in Nigeria, the authority's ownership of general cargo berths will be limited in the first instance to the two main ports of Lagos and Port Harcourt. The position at other ports will be reviewed later.

Where the operation of port labour is concerned, it is interesting to note that under the terms of a Government White Paper, a specific duty is placed on the Ports Authority for the stabilisation and direct employment of shore labour; shipping companies will, however, continue to be responsible for ship labour.

Nigeria also possesses extensive inland waterways and these too will be managed by the Ports Authority until the Government has decided its policy. An independent investigation concerning the future of the waterways has already begun, and a Report of its conclusions is expected in about three years' time.

The establishment of this autonomous and financially self-supporting authority is a noteworthy development, and is likely to have far-reaching effects on the future of Nigeria. There are two features of particular interest concerning the constitution of the Authority. The first is that users of the port have been able to elect their own representatives who will be given voting powers according to the sums of money they pay towards port revenues. The second is that in order to conform to the new federal organisation of the country, the three regions will be consulted by the Minister of Transport regarding the appointment of two representatives from each. Direct representation of labour is also allowed for, and a further member of the Board will be chosen by the Minister of Transport after consultation with the trade unions. Other members include a representative from the Nigerian Railway, and an expert on the export of produce.

Move Toward Port Authority for Baltimore, U.S.A.

During recent months reference has frequently been made in the American press to the movement in Baltimore for the creation of a powerful State port authority which would have broad powers to build and maintain piers and also certain controls over the private terminals. This movement has been gathering momentum, and has received the backing of some influential labour groups, shippers and some steamship companies.

Such an Authority was strongly recommended in the Knappen-Tippetts-Abbett survey of port needs in 1950, but the opposition of the railways, which virtually own and control all public terminals, prevented any action at that time. As a compromise, an Enabling Act establishing a Port of Baltimore Commission with most of the powers of a port authority was passed by the Legislature. The ordinance establishing the Commission, however, limited the activities of the Commission to such an extent that all it can do is lend money for private construction, subject to approval of city bond. It cannot undertake port improvement works on its own initiative, and has no funds for port promotion schemes.

With so much of the economy of the State of Maryland depending directly or indirectly on the prosperity of the Port of Baltimore, it has become increasingly evident that the present Commission is impotent, and should be substituted by a body with powers to build and modernise piers, engage in promotion work and eliminate the present multiplicity of port agencies.

The latest reports state that the City Board of Estimates has approved an outlay of $17,500 for a revision of the Consulting Engineers' port survey referred to above, and the State has agreed to contribute a similar amount. However, faith in the outcome of this study is not strong among Baltimore shipping and trade interests, and recommendations have been made for abolishing all existing legislation and agencies concerned with the port, and substituting an autonomous central port authority "selected without regard to special interests with a source of revenue guaranteed, and with authority to float its own bonds."

Public hearings on what type of State port authority is needed, and how to finance it, were held last month by the Legislative Council's special Port of Baltimore Committee. The agenda was drawn up by special sub-committees, who also prepared a list of industry leaders who would be invited to offer their comments. At the meeting, the engineers conducting the revised study of the port were assured a completely free hand in preparing their recommendations upon which State action will be based at the Legislature sessions to be held next January.

The Humber Ports.

The publication of the fifth instalment of the series of articles on the Humber Ports which is at present running in this Journal, has been unavoidably deferred. It is hoped that this instalment, which deals with the engineering aspects of the post-war reconstruction works which have been carried out at the Port of Hull, will appear in our January issue.

The Port of Rijeka, Yugoslavia

An account of its History and Development

(Specially Contributed)

THE port of Rijeka, better known to old sailors as Fiume, is situated on the Gulf of Quarnero, about 40 miles south-east of Trieste, as the crow flies, but 140 miles by sea, around the coast of the Istrian peninsula. Rijeka has had a most chequered history, both in the political and in the maritime spheres of influence. Several times it reached importance in the world of shipping and as often has been virtually humbled to inconsequence. With the recent settlement of territorial rights and boundaries between Italy and Yugoslavia it has again become the most important and the most favoured port of the State. Although the population is small it is imbued with optimism and ambition to regain past glories and heightened security in the development of seaborne traffic through the port.

Scattered along the coast about Rijeka there are a number of attractive seaside resorts which, in the days of sailing ships thrived as ports and centres of shipbuilding: the immediate hinterland providing many excellent timbers for the latter industry. Incidentally at Kraljevica a prosperous shipyard was founded several generations ago by an Englishman called Pritchard whose descendants still remain.

The majority of dock and factory workers, and other industrial labour, is drawn from the many small towns and villages inland, about Rijeka.

Beginnings of Trade.

Historical records of this turbulent area show that overseas commercial activity flourished in Rijeka in the fifteenth century, which is remarkable since her powerful and aggressive neighbour Venice, at the head of the Adriatic, did not look with favour or forbearance on any competitors trading within the zone of her influence. In consequence the shipowners of Rijeka had to seek or dispose of their wares further afield. Whilst this was a handicap it was also a strong stimulus which knit the maritime community together, and instilled a strength of character in the townsfolk which has helped in their survival through adversity.

Due to the invasion of the Turks in the second half of the 15th century and early in the 16th century, trade declined rapidly and finally became limited to the needs of the towns people, which then numbered some 2,500 inhabitants. Such a state of affairs lasted until the beginning of the 17th century, when commerce began to revive. Rijeka gradually re-established the old business relations, the trade chiefly consisting of salt, wool, iron and wood which were warehoused, sold and transhipped from Rijeka.

At the beginning of the 18th century, Charles VI, who was interested in encouraging maritime trade, ascended the Austrian throne, and in 1719 he declared Rijeka and Trieste free ports. Special privileges, enabling free entry and trading without payment of Customs, or other fees, were bestowed on these two ports, and local and foreign merchants were allowed to store their goods in State and private warehouses. Foreign merchants, wishing to become citizens of Rijeka, could do so without obstacle, and had their property safeguarded. Should such merchants be forced to leave the country in the case of war, they were allowed to sell their goods and take their capital with them without hindrance. These privileges attracted many merchants from various countries to Rijeka.

In the same year, a new commercial company was formed with the name "Oriental Company," and with a capital of 1 million Austrian florins in which the Emperor himself had an interest. The head office of the Company was in Vienna, with branches at Trieste, Rijeka, Bakar and Kraljevica. Its purpose was the development of trade both with European and Asiatic countries. Honey, wax, oil, metal, ores, linen and other goods coming from Hungary, Moravia and Austria were immediately shipped from Rijeka to Portugal and the East.

Throughout the 18th century business flourished, as was proved by the objections of the Trieste population, who complained that the traffic which had formerly passed through the port of Trieste was being diverted to Rijeka, especially the important iron and linen trades.

The successor of Charles VI, Maria Theresa, followed her father's policy in dealing with the sea-ports. At that time the question of the necessity of one maritime emporium for the whole empire arose, and in 1748 the Empress founded the "Maritime Province of the Coastland," in which the ports of Aquilea, Trieste, Rijeka, Bakar, Kraljevica, Senj and Karlobag were included. Its supreme board of administration was based in Trieste and bore the title "Imperial Royal Supreme Commercial Administration." It aimed at developing the trade of the ports with their respective hinterlands, and the province was intended to be autonomous.

Trade was encouraged by a growing industry, one of the most important of which was the sugar-refinery which was founded in 1750. A concession was granted for a period of 25 years with the proviso that during that period no other territory in the Empire would be permitted to build another refinery. All building materials and all the raw materials for manufacturing were free of Customs duties or any other fees. By 1754, the refinery was able to supply sugar sufficient to meet the needs of the whole Empire. The concession was extended twice, and the refinery stopped working in 1826. Besides the sugar-refinery, shipyards were constructed and factories were built for the manufacture of tobacco, candles, rope, soap and leather.

In the first half of the 19th century the Paper Mills, founded by an Englishman named Smith, in partnership with a Frenchman, Menier, were built. These still exist, and rank among the best known mills for cigarette paper in Central Europe.

The Old Harbour of Rijeka.

The old harbour was situated at the original mouth of the River Rjecina, now known as the Dead-Canal (shown in Fig. 1 as Mrtvi Canal). Originally this was flanked with timber wharves which were subsequently replaced with stone quay walls. In the middle of the 18th century the last quay wall was extended into the sea in the form of a break-water; a few years later, a spur jetty was built outside the harbour itself, nearer the town. A timber jetty was also constructed for small vessels and further to the west, a timber quay for discharging charcoal.

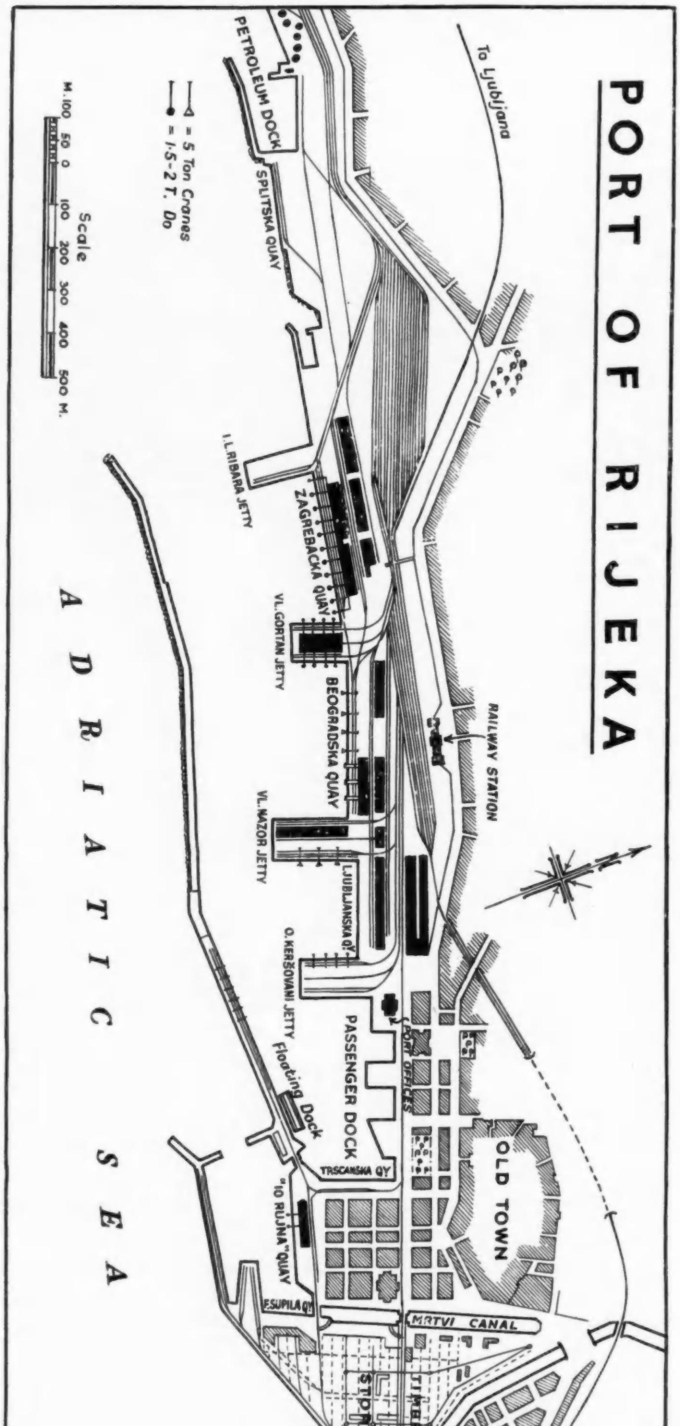
From 1595 to 1752 the port was under the town's jurisdiction, but in the latter year was transferred to the State. According to records, in the year 1760, 1,342 vessels entered Rijeka, and 1,446 vessels left. The majority flew the Austrian flag, the rest those of Venice, the Papal States, Turkey, Dubrovnik (Raguoa) and Naples. There were also listed four vessels flying the Dutch, two the Danish and one the French flag.

The chief imports were raw sugar, corn, coffee, salt, hemp, oil, cotton, wines, hides, linen and paper, and the total value amounted to 851,600 Austrian florins.

The revenue from the harbour dues was not enough to keep the port, which was often blocked by siltation from the Rijecina, in an efficient condition, and the town's treasury had to be used for the maintenance of the harbour. Even so, sufficient depth of water could not be maintained, and fully loaded vessels had difficulty in berthing. Once the administration of the port had passed to the State, the harbour was dredged and the quays and the wharf extended. Unfortunately, during the Napoleonic wars the Treasury was exhausted, and by 1819 the harbour had become inaccessible.

It was obvious that a harbour situated at the mouth of the Rijecina could not cope with any development of traffic because

The Port of Rijeka—continued



it was constantly silting up. In 1820, therefore, it was decided to divert the course of the Rijecina and allow the sea to penetrate into the original bed, thus changing its into a canal, which would serve as a safe harbour. At the same time a scheme for building a new harbour further to the west fronting the town was considered.

The new harbour was built by the town's magistracy, subsidised by the State, and a small breakwater and one wharf were constructed.

The Hungarian Government was willing to support the building of the port, but the revolution of 1848 upset these plans. On the conclusion of the conflict between Austria and Hungary, the works were resumed. The bed of the Rijecina was changed, and the sea let into the old bed, along which training walls were erected. This formed the Dead Canal which actually serves as berthage for vessels of small tonnage.

The traffic between Rijeka and the hinterland was first directed on three routes, constructed at different periods, and these connected the country's industrial centres with the port. After the railway line Sisak-Zagreb-Zidani Most, connecting the inland with Trieste, had been opened however, Rijeka lost nearly all her traffic to that port. Consequently, both the new and the old harbours remained unused (see Fig. 2).

The Hungarian Government speedily intervened, and by 1873 the branch line Pivka-Rijeka was built. Pivka is the point where the railway line from Ljubljana branches off towards Rijeka and Trieste. In the same year the railway line Karlovac-Rijeka, connecting Budapest with Rijeka via Zagreb, was built, and at the same time work on building the new harbour was intensified. The opening of the new railway line meant total decay for Bakar, Kraljevica and Senj, and pre-eminence for Rijeka.

Development of the New Port of Rijeka.

The development of the new port can be divided into three successive periods, the first running from 1875-1914, the second from 1914-1945, and the third from 1945 to the present day. In the first period Rijeka belonged to Hungary, in the second to Italy and in the third to Yugoslavia.

Hungary, surrounded by land on all sides, needed an outlet to the sea. Along the Croatian Coast there were several places fit for the building of a harbour, especially Bakar, which is a naturally enclosed and sheltered in a deep inlet. On the other hand, Rijeka harbour was quite unsheltered by nature, and large areas of the sea had to be enclosed for construction of the quays. The railway line Karlovac-Rijeka had been constructed far from other outlets to the sea in order to prevent them from developing into competitive ports. From the business point of view, Rijeka had its advantages, inasmuch as no important navigable river flows into the Adriatic to connect with the hinterland, and consequently a place nearest to the centres of business had to be chosen. This was obtained by deciding on a position on the eastern shore of the Adriatic, where the sea cuts farthest into the land.

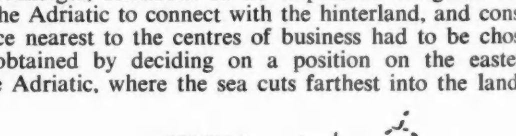


Fig. 1 (left). Plan of Rijeka (Fiume) harbour, showing the timber storage yards in Susak to the right, and the Dead Canal (Mrtvi Canal) which once was the course of the River Rejecina now diverted further east.

Fig. 2 (above). The main line railway system linking Rijeka to Italy, Germany, Hungary, Belgrade and Budapest.

The Port of Rijeka—*continued*

General view of shipping in the Port of Rijeka.

The railway system at that time was such as to connect all the branch lines with the mainline which led towards the centre of the State or towards the sea to Rijeka. As a consequence all the towns along the shore for 1,000 km. as well as all the islands had to be supplied through Rijeka or Trieste, which greatly fostered the development of their traffic.

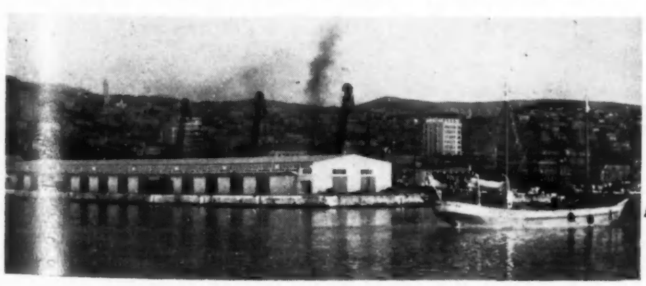
Traffic through Rijeka was encouraged by a favourable railway freight-rates system. The greatest importance was also given to the regular shipping lines which are indispensable to the development of a port. Thus, besides local shipping, foreign lines were also encouraged, which gave Rijeka the aspect of an international port. Local shipping companies maintained regular connections with all Mediterranean ports as far as Valencia in Spain, and further away, with all the important European ports in France, England, Belgium, and Holland, and also with Brazil and Australia. Some English, Dutch and other shipping companies also maintained regular lines with Rijeka, and these still visit the port, although to a lesser extent

During the period in which Rijeka belonged to Hungary, the harbour with its modern breakwaters and wharves, and with the necessary mechanical appliances was built. A number of multistoried warehouses and timber-yards were constructed, and all the quays and wharves were provided with railway tracks.

The harbour was divided in two parts; i.e. the harbour proper of Rijeka and the harbour of Susak which was to the east of the Dead Canal already referred to. The Rijeka harbour was used mainly for the handling of mineral oils, rice, cotton, wool, hides, flour and other general cargo. The Susak harbour was used for general cargo, coal, and phosphate, but mainly for export of timber (see Fig. 1).

A separate part of the port was the Petroleum harbour used for discharge of naphtha and its derivitives.

With the growth of the port, commerce and industry developed, and a number of exporting and importing firms established their offices in the town. Here was also situated the shipyard "Ganz-Danubius," where Austro-Hungarian men-of-war, such as the "Sent Istvan," were built. For a time this yard also had a branch at Kraljevica. There also existed a torpedo-boat factory founded by an Englishman named Whitehead.



Post-war reconstruction. New transit shed recently completed.

After the fall of the Austrian-Hungarian monarchy, Rijeka was allotted to Italy in the peace treaties, whilst Susak—following the treaty of Rapallo—was transferred to Yugoslavia, and a new period in the development of the port of Rijeka began.

Geographically, Rijeka is an organic part of Yugoslavia, and is served by all the railways of the country, which link up with the port. As a result of the change in sovereignty, Rijeka was arbitrarily divided from its natural hinterland, by a canal only a few metres wide, and consequently became moribund. Italy was divided from her new territory by the Adriatic, and in addition already possessed two great ports on the Adriatic, i.e. Venice and Trieste so she was unable to supply Rijeka with any trade.

Yugoslavia concentrated her trade in her remaining ports, the overseas trade of Hungary was insignificant, and the traffic from other countries such as Austria and Czechoslavakia went through Trieste, whose existence mainly depended on their trade. As a result the port of Rijeka declined rapidly, and relied exclusively upon its local traffic, which amounted to some 150,000 tons of mineral oils, and about 400,000 tons of general cargoes yearly. In comparison with the pre-war traffic this was negligible.

Meanwhile, in the period between the two world wars, Susak, a port one-third the size of Rijeka, had a much greater international trade, one half of which consisted of timber exports. After the second world war Rijeka was restored to Yugoslavia.

Area of Port and its Equipment Prior to 1941.

The total water area covers about 60.3 hectares, and the quays, wharves, warehouses, and railway sidings occupy a further 38.5 hectares. The depth of water along the quays and wharves varies between 4.5 and 8 metres. The harbour, which is protected by two breakwaters, one 1,754 metres long and the other 555 metres long, is divided into four basins, three comprising Rijeka, and the fourth Susak. The Petroleum Harbour forms a separate entity. The area of the wharves is about 90,000 sq. m.

Before the war there were 43 electric quay cranes with a capacity of 1.5 to 3 tons and 39 multi-storied warehouses, having a total area of 160,171 sq. m. Most of these were situated in the free-trade harbour, which also contained a grain silo with a capacity of 8,000 tons.

In the Susak harbour there were also yards for the storage of timber, and Rijeka had storage facilities for naphtha and its derivitives and creosote.

The Situation After the War.

At their retreat the occupying troops completely destroyed the port, and made it totally inaccessible to shipping. All the cranes were either completely destroyed or heavily damaged, and the warehouses and the railway sidings demolished. Nothing but ruins was left of the small but up-to-date and well-equipped port, and

The Port of Rijeka—*continued*

View of the Port in 1945 following the retreat of the German armies.

when Yugoslavia took possession it had to be fully rehabilitated.

The rebuilding was started without delay. Quays and wharves were rebuilt and adapted for the requirements of modern traffic. The cranes were reconstructed, and seven new ones with a greater capacity of 5 tons each and with grabs were erected. These cranes handle the loading and discharge of coal and ores. The warehouses have been rebuilt, but in some places instead of multi-storied warehouses, modern sheds are being erected.

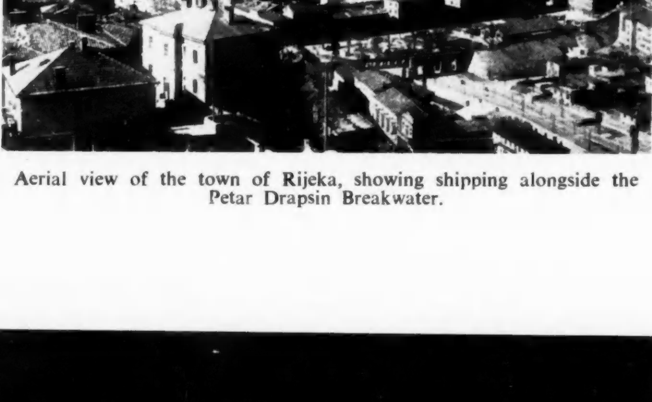
The rebuilding of quays and wharves has already been completed in three basins, and work in the fourth is well in hand.

The present position is as follows:—

Furthest to the west is the Split quay, 130 metres long, for the loading of wood and ores

Proceeding eastward there are the following basins; the first one formed by the Zagreb quay 360 metres long, and bounded on one side by the Lola Ribar jetty, 160 metres long and 80 metres wide, and on the other by the Vladimir Gortan jetty 120 metres long and 80 metres wide. The second basin is formed by the Beograd quay 360 metres long, and is bounded on one side by the Vladimir Gortan jetty, and on the other by the Vladimir Nazor jetty, the eastern side of which is 170 metres, and the western side 210 metres long; it has a breadth of 80 metres. Between this jetty and the Otokar Kersovani jetty of 150 metres length and 80 metres breadth, is the Ljubljana quay 250 metres long. Along all the above quays there are 2-4 storied warehouses. On the Vladimir Gortan jetty there is a modern 4-storied warehouse, and on the Vladimir Nazor jetty a modern shed with an area of 3,500 sq. m. has been erected.

On the eastern side of the Otokar Kersovani jetty is a quay 190 metres in length, which is used for the berthing of vessels with a draught not exceeding 4.5 metres. All the above-mentioned



Aerial view of the town of Rijeka, showing shipping alongside the Petar Drapsin Breakwater.

basins are protected by the Petar Drapsin breakwater which also serves for the berthing and bunkering of vessels.

Still further eastward is the basin of Susak, reached by the Trst quay, or across the bridge on the river of Rijecina, which divides Rijeka from Susak.

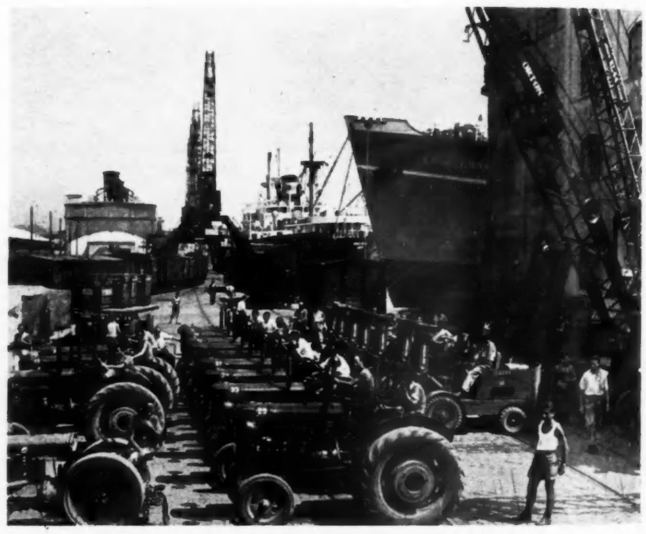
The basin of Susak consists of the 10th September Quay which is connected with the Trst quay and is 242 metres long. Across the swing-bridge on the Dead Canal there is the Supilo quay, on the northern side 106 metres, and on the southern side 104 metres long. The harbour is closed by a breakwater, which also serves for the berthing of vessels and handling of cargo.

On the 10th September quay there are modern two-storied warehouses, and timber handling facilities.

The total warehousing area in the port has been reduced, since the warehouses have not been rebuilt on the wharves, in order to obtain more space on which to erect transit sheds. For the time being, there is a total warehousing area of about 96,000 sq. m., with a capacity of 80,000 tons. On the berths there are 38 cranes of 1.5—5 tons capacity. In addition there are two floating cranes, with lifting capacities of 60 and 40 tons respectively.

Railway Connections.

Rijeka is served by two railway systems. One passes across Pivka and Ljubljana, connecting Yugoslavia with Italy across the



Some of the equipment parked for inspection.

territory of Trieste and through its branch-lines of Ljubljana-Jesenice it connects Yugoslavia with Austria, Czechoslovakia and Southern Germany. This is electrified as far as Postojna.

The second line passes across Plase-Karlovac and Zagreb, and connects the middle and eastern part of Yugoslavia with Hungary, Poland and Rumania.

Within the port itself all the principal docks have rail tracks, having a total length of about 17 kilometres. The capacity of the railway sidings amounts to some 800 wagons per day.

The railway service is run by the railway administration, conforming to the directions of the Bonded Warehouses and others concerned.

Bonded Warehouses.

All the warehouses in the port are managed by the Enterprise "Luka i Skladista" (Harbour and Warehouses), which also deals with the loading and discharge operations of both vessels and railway trucks. It works on the principles of Bonded Warehouses, and takes the goods for storing, handling, marking, etc. It also issues warrants on the stored goods, takes over the goods from Yugoslav and foreign agencies and deals with them as instructed. From the Bonded Warehouses the goods can be re-forwarded either to the interior of Yugoslavia, or to foreign

The Port of Rijeka—continued

countries. The goods in transit are not subject to Customs or Excise duties.

The reforwarding of the goods to the interior of the country or to foreign countries is in charge of forwarding agents, who act in accordance with the custom and international laws. They affect clearance through Customs, and undertake all other operations their Principals entrust to them. The warehouses are equipped with tractors, trailers and fork-lifts.

Most of the Yugoslav overseas traffic moves through the port of Rijeka, which is well equipped for the handling of general cargo, especially ores and coal.

In the timber yards, stocks of between 30 and 50,000 sq. m. of various timbers are stored, from whence it is despatched to all countries in the world. Other important exports include ores and concentrates, corn, dried fruits, preserved fish, and various other Yugoslav products.

The principal imports are coal, coke, ironmongery, colonial products, cotton, wool, hides and general merchandise.

Traffic with the Near East, Western Europe, North Africa, and South America is the more important, whilst trade with the Far East is being gradually developed.

At present, the yearly traffic of the port amounts to about 2 million tons, although the capacity of the port is much greater.

Commerce, Industry and Shipping.

Nearly all the great export and import enterprises of Yugoslavia have their main offices or branches or representatives at Rijeka. One of the main industries is the shipyard "III MAJ," where some modern liners, and several coasters have been built. There is also a motor factory, an oil refinery, a plywood factory (working mostly for export), and the greatest paper mill in Yugoslavia (ex "Smith Meynier") and several smaller factories. Ship repairs are carried out in the main shipyard, as well as by several smaller shipyards and repairing works. A floating dock with a capacity of 15,000 tons is also available in the harbour.

Up to the present the chartering of vessels has been mostly undertaken by the branch office of the Yugoslav Shipping Agency with the main office in Beograd (Belgrade), and also by some forwarding agents. Port agent's duties are carried out by the Adriatic Shipping Agency with the main office at Rijeka. This agency has its branch offices in all Yugoslav ports. The main Yugoslav shipping companies, both for transatlantic and coastal navigation, have their offices at Rijeka. Among these is the "Yugoslav Line" which maintains both liner and tramp services with foreign countries. A tramp service between the Adriatic ports, and the nearby Mediterranean is managed by the "Jadranska slobodna plovidba." The "Jadranska Linijska Plovidba" (Adriatic Line) manages the coastal navigation along the Yugoslav coast of the Adriatic from Rijeka to Bar. This Company owns various small vessels for both cargo and passenger traffic, and also a number of passenger only vessels especially fitted for the tourist trade which grows in importance, a great number of tourists passing through Rijeka each year.

At present all port operations are being carried out by the Enterprise "Luka i Skladista" (Harbour and Warehouse) but a reorganisation of the port management is in hand. Stevedoring companies will be instituted and the Harbour Administration will become a separate body, subject to the town of Rijeka. The new Harbour Administration will be responsible for the smooth co-ordination of all port operations, and also will be in charge of construction, modernisation, and improvement works in the port.

The Coastwise and Cross Channel Trades

Problems of Dock Labour Costs and Port Charges

By M. ARNET ROBINSON, M.Inst.T.

Some of the current problems confronting the coasting liner trade and the short sea trade were discussed in a paper entitled "Coastwise-Cross Channel", which was read before the Institute of Transport in London on November 15th, 1954. The author is Managing Director, Coast Lines Ltd., and Deputy Chairman of the Mersey Docks and Harbour Board. In 1954 he was appointed by the Minister of Transport to serve on the Ports Efficiency Committee.

Many ships which are employed, or are capable of being employed, in the coasting trade are equally suitable for the cross-channel trade. There are admittedly some types of ships in the cross-channel trade, such as passenger vessels and cattle ships, which are in no way suitable for the coasting trade, but broadly cargo ships are suitable for each.

While cargo ships may be equally suitable coastwise or cross-channel, the commercial and competitive conditions differ completely. It is necessary, therefore, to treat the coastwise problem separately. At the outset it may well be asked why there is a problem at all; I have frequently met intelligent people who say "surely transport by sea is the cheapest of all methods and I cannot understand why in these circumstances you coastwise people should apparently have such difficulty in competing with the land routes." This to my mind is a perfectly fair query and one which requires answering. The fact remains that the coastwise trade has been under critical review for 25 years or so from the standpoint that it was declining, and it was the desire of successive Governments that an adequate and efficient coastal fleet should be maintained. This I feel would be the desire of most people, quite apart from those who have the responsibility for the war potential of the country. The experience of two major wars has proved, if any proof were necessary, the vital part played by this type of ship and those who man them in the marine forces. In peace time few would dissent from the proposition that in an island such as ours with a dense population and great pressure on the land routes, particularly road, it would be a pity, to say the least of it, if adequate use is not made of the sea surrounding us and the numerous ports we possess. In passing I might refer to the recent correspondence about the difficulties which have arisen owing to the transport of heavy loads by road and the query whether the consequent dislocation and damage might not have been avoided or be avoided by greater use of coastal shipping. Nobody in coastal shipping would suggest that all these loads could have gone by sea but I say unhesitatingly that many could.

It has always been claimed by the representatives of coasting shipping that they had to compete with unduly low exceptional rail rates. I suggest that there is ample evidence to prove that there were in existence numerous very low rail rates which had been put in in competition with the coasting routes. Possibly it might be claimed that that was the result of completely unfettered competition: certainly over the whole country a considerable proportion of exceptional rates for the carriage of goods bore little, if any, relation to the calculated costs, or to comparable rates elsewhere. It was at any rate perfectly clear in the minds of the operators of coasting shipping that their real trouble in meeting competition was the existence of these very low exceptional rates. I know that the basis of railway costings is so largely conditioned by the heavy proportion of standing charges, but nevertheless it is in my view a doubtful and frequently dangerous policy to let it be thought that it is possible or economically justifiable to offer a service at a percentage of 60 per cent. or more below the normal. Staffs should never be led to think that turn-over in itself is sufficient. With coastal shipping, or in fact any shipping, the cost factor is at once apparent and any ship operator knows the net amount required to make a voyage profitable or otherwise.

Transport Act 1953

It will be interesting to see what developments occur under the newest Transport Act. Is the country prepared to see the entire transportation dependent on the roads with coastal shipping and the railways having disappeared? If the answer is yes, then no Government investigations or committees or anything of that sort is required to ponder the problem of coastal shipping. Mr. K. F. Glover and Mr. D. N. Miller in a paper given to the Royal Statistical Society claimed that nearly 75 per cent. of Britain's freight went by road. That is a significant amount: one

Coastwise and Cross Channel Trades—continued

would not seek to minimise for a moment the efficiency and flexibility of road transport and its undoubted advantage to traders in many cases. The real question to my mind is—what form any further development is going to take? I cannot believe that it is either to the national well-being or to the utlimate advantage of the trader if we are going to have a resurgence of irresponsible operators accepting cut rates largely because they do not know their own costing. Unfortunately transport for some extraordinary reason is first to be assaulted in any matter of costs.

The development of road transport had a profound effect on the whole system of charging. The railway rates structure had a considerable element in it of what is generally termed "what the traffic will bear"; so had the tariffs of coasting liner companies. Broadly, this meant that high classed goods carried a proportionately higher freight charge than low classed goods. I do not refer in this connection to full cargoes by coasting tramps where the actual costing is easily ascertainable. The road transport industry did not have any rates structure and for the most part was prepared to carry any goods of reasonable stowing capacity and value at approximately the same rate. This system of charging involved both the railways and the coasting liner companies in a reduction in the charges for higher rated goods if they were to compete. It upset the balance an which a mixed cargo by coasting liner had been built up. I personally believe that a rates structure which embodied a substantial element of "what the traffic will bear" was by no means unsatisfactory, and furthermore, that there is such an element in most comercial transactions. Apparently, however, this altered basis is now regarded as something which must be accepted, and one understands that the railway experts are working on a revised system of charging which will be based largely on "loadability." It remains to be seen how this will all work out and what effect it will have on coasting shipping, but I venture the opinion that any system based solely on that will involve the creation of a further large number of exceptional rates.

Costs of Operation

The coasting liner companies whose business it is to provide regular services on stated routes for the carriage of general cargo have sought strenuously to rebuild their trades after the war and to provide shippers with the services they want. I think that carriage by sea is the cheapest of all. With a modern economical ship on a coastal voyage, the cost per ton mile including depreciation can be as low as ½d. Actually, carriage by sea, particularly for general cargo, is by no means the end of the commitment. Charges arise at the ports at each end in the shape of dues on cargo, wharfage charges, and in many cases cartage also. This is quite apart from the labour costs for getting cargo in and out of ships. It is the aggregate level of these charges which is in many cases so alarmingly high and which, in sober fact, can and do prevent the coaster competing at all. The coasting owners have done their part and taken the risk of providing economical and up to date ships, but if the coasting trades are to flourish, it is equally important that terminal facilities should be economical and up to date. The trade is highly competitive and simply will not stand high charges.

It is within my knowledge that the ability or otherwise of the coasting companies to maintain, let alone develop, any particular service depends on the aggregate level of costs at the ports concerned. I would give one simple but pertinent example; dues on cargo in the ports have developed over the years out of a wide variety of commercial considerations but the basis certainly was that the trader, whether exporter or importer, would pay them additionally to the freight of the ship. With coasting liner shipping all that disappeared some time ago, as the shipowner must quote an inclusive rate as would be done by rail or road. The coasting owner is frequently faced with the position that although he is competing against precisely the same rate on several commodities, the dues may vary by many shillings per ton. On the commodity where the dues are reasonably low, he may be able to compete, whereas with the high dues he cannot at all. This is admittedly a big subject but is one which I commend earnestly to the attention of port authorities. If anybody has the idea that it is always possible somehow or other to get over such difficulties, I would say that this is certainly not the case. I have already indicated that at ports where the terminal charges are unduly high, the coasting trade is declining or in some cases has even disappeared, whereas at ports where terminal charges are reasonable, the coasting owners, who are naturally anxious to foster trade, have been enabled to do so.

The Dock Labour Scheme

The cost of loading and discharging cargo is a substantial item to come out of the coasting freights. Both the cost and the speed of these operations vary considerably between the ports. I have always supported the principle of decasualisation of dock labour, and 30 years ago collaborated with the late Mr. D. Ross Johnson who worked so hard as a pioneer in this field and who succeeded in introducing a workable scheme at Bristol. I still have the pamphlets he wrote and have always felt that he did not receive the recognition he should have done for his efforts. The present scheme, however, does have some disadvantages, the chief of which, I believe to be that all men are lumped into one category. I realise that on occasions men are taken on to a supplementary register but this is only an *ad hoc* arrangement. I believe it to be sound and reasonable that there should be an "A" and a "B" category, the "A" men representing the labour force which is likely to be required for most of the year and carrying the full advantages of the scheme, the "B" as supplementary and not confined necessarily all the time to purely dock work. I know fully well that there are difficulties about that, but the present scheme involves the inescapable dilemma that if the labour force is to be adequate at busy times, then there is a likelihood that the cost will be excessive. If on the other hand the labour force is not adequate for such times, then ships will be delayed.

This is a very real problem to the coasting trade and in my own company, which trades to most ports in the Kingdom, there is seldom a week when a ship is not delayed at some port owing to shortage of labour. The coasting schedules have to be drawn up in terms of days or even sometimes hours and that a ship should be idle at a Port for even one day will throw out the schedule and have far reaching effects. I realise that those concerned with operating the labour scheme at the ports do their best but the difficulty is there and I trust will in some way be resolved. The coasting trade is a highly competitive business and must all the time—and very properly—be offering a service which will attract and satisfy the shipper.

As I have already said, the type of ship for the transportation of cargo cross-channel is the same as coastwise. Bulk cargoes move in ship loads in the typical single-deck coasters and the only problem is the size of ship appropriate for any particular trade. Several of these trades for various reasons cannot accept the biggest type of ship at present employed in the East Coast coal trade. Apart from bulk cargoes, a substantial number of general cargo vessels running to schedules is required and it is essential that they should be of a type in which any type of sundry traffic can be stowed and carried satisfactorily. In fact, the general cargoes are of an extremely miscellaneous nature and call for not only high class ships but specialised staffs to deal with them at the ports at each end. This inevitably involves a considerable organisation, particularly as in many cases a ship will load one day and sail the same night and the manifest must be made up by the time the ship sails.

It will be appreciated that the technique to deal with such trades and cargoes differs fundamentally from the carriage of full cargoes where no detailed work whatever is involved. Between Ireland and this country there is a large and important trade in live stock for which a specialised type of vessel is required. The difficulty of the trade is that the big movement is a seasonal one meaning that additional ships are required for a limited period only. With present costs this presents a considerable problem, as hitherto a cattle ship has been a poor economic unit for the carriage of cargo. My company has been working on this problem with a view to trying to evolve a ship which will conform in every way to the requirements of the Ministry of Agriculture and the cattle trade, and at the same time will be really suitable when required for general cargo. We have recently commissioned a ship which we believe to be a big advance in that direction.

Ports and Shipping—Yesterday and Today

Presidential Address to the New Zealand Institution of Engineers*

By N. L. VICKERMAN, D.S.O., O.B.E., M.Sc., M.I.C.E., President 1953-54
(Chief Engineer, Port of Auckland, N.Z.)

IN an Institution such as ours, which embraces the science of engineering in its several branches, the choice of a subject for a presidential address is very wide indeed. This fact alone imposes on the president a responsibility to choose a subject of wide interest.

I have chosen to talk to you of ports and shipping, this being a subject that embraces many branches of engineering, and the one with which I am most familiar.

It may be considered of particular interest this year, because of the recent visit to our ports of the Royal Yacht " Gothic," bringing to our shores Her Majesty Queen Elizabeth and His Royal Highness the Duke of Edinburgh.

Most people are interested in ports. They like to visit the wharves to see the ships discharging, the cranes working, and all the many activities associated with it. They like to watch the vessels entering and departing, to visit the beaches for swimming and boating, and altogether they derive much pleasure from their harbours.

In New Zealand this is particularly so. Our coastline is long in proportion to our area, our principal cities are located on harbours, we rely on shipping for our external trade and much of our internal trade, and we have, therefore, more people interested in harbours, in ships, and in cargoes in proportion to our total population than most countries, particularly those whose trade is partly by land routes.

A port is defined as a place where ships may ride secure from storms; and in law and commercial usage, as a harbour where vessels are admitted to discharge and receive cargoes, from whence they depart, and where they finish their voyages.

There is romance in these words, conjured up from the days when a ship was a picturesque but inefficient sailing craft, very much at the mercy of the winds, when it was a considerable adventure to make a voyage, and when a harbour secure from storms was of more importance than a wharf loading its small but valuable cargo.

There is still a certain amount of romance about a port, though the small and picturesque sailing ship with its rare and valuable cargo has given place to the power-driven vessel carrying thousands of tons of common merchandise, which is safe at sea in any kind of weather, and which values a port more for its ability to handle cargo than for its security from storms.

Harbour construction was a well-established and important branch of engineering 2,000 years before Christ, and there is a great deal of interest in its early history. It is equally of interest to study the ships of those days and to trace the changes that have taken place through the years.

I propose, however, to review developments of the last forty or fifty years, partly because so much has happened in that time, and partly because it is within the memory of so many of us. It will be of interest to recall some of the things we once knew as modern, but which have long since given place to others.

I will deal very largely with developments as we have seen them in New Zealand, but not with reference to any particular port. I shall, however, make some reference to developments overseas, where conditions are similar to those in this country, in order to show some changes that are likely to be seen here before long.

Early Wharves.

In the early days of New Zealand ports, when settlement was just starting, the building of even a small wharf was a major financial undertaking. It was natural and economical for the first wharf to be built as near to a suitable landing place as water conditions would permit, and for the commercial town then to grow as near to the wharf as land conditions would permit.

The wharf was made to suit the size and draught of ship then trading to the country, for, though future development was by no means overlooked, present need was of more importance to the new settlers.

I would like here to digress for a moment. In those days there was no Town Planning Act setting out the things that could not be done, and probably no building by-laws either. It was left to the local community to develop trade and port facilities in a suitable manner, meeting the needs of the day as they arose, and looking reasonably far into the future as they could then see it.

I think that, on the whole, those early communities made a wonderfully good job of what we now call town planning and are apt to look upon as a new science, but what, at that time, was accepted as the normal function of the engineer, the surveyor and the architect.

Town planning is essential; it has always been so and is particularly so at the present moment because of the rapid changes in our way of living. But in our enthusiasm for the present, let us look back into the past and think what would have happened if our early forefathers had tried to plan their ports and cities for the requirements of to-day. It will then be clear that planning is a continuous process and must meet changes as they arise. To try to plan too far ahead will cause stagnation and will result in no fewer mistakes than have been made in the past.

Returning now to our early wharves. These were built of timber, of which there was a plentiful supply in the country. However, few of these timbers were immune from attack by the *Teredo*, or shipworm, and suitable for piles or underwater work. The best was totara, particularly that grown near the coast; but this timber, while resistant to *Teredo*, was subject to attack by *Limnoria* and *Chelura*, two very small crustaceans which burrowed into the surface of the timber between high and low water, destroying it from the outside. In addition, the supply of totara trees that would cut economically into piles was limited.

It was natural, therefore, that harbour engineers should take advantage of the Australian hardwoods which could be procured relatively cheaper and were some of the best timbers for wharf construction. There are few better timbers than ironbark for beams and brushbox for decking, and there are many other species almost as good.

The hardness of a timber is, however, no criterion of its resistance to marine borers, and the only one of the readily available hardwoods that was immune from attack was the turpentine (*Syncarpia laurifolia*). Other hardwoods were quickly attacked, and when used for piles were sheathed with copper or muntz-metal from mud level to high water. This sheathing had to be kept in good repair, as the *Teredo* would enter any place where it was torn and would quickly riddle the pile.

This was the position at the commencement of the period under review. Most wharves were of timber, Australian hardwoods were extensively used, and a continuous war was being waged against marine borers.

Modern Wharves.

About this time a new form of construction became available which has enabled us to meet all demands for the heaviest type of work. I refer to reinforced concrete. With this there is no difficulty in providing piles up to and exceeding 100-ft. in length, and no limit to the strength of the superstructure and its ability to take the heaviest of loads.

Construction is relatively simple, requiring only care and good

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Ports and Shipping—continued

workmanship; but these are important, as a poorly built wharf of reinforced concrete can become a liability rather than an asset.

Probably the feature requiring most skill is handling and driving the heavy concrete piles, weighing from, say, 10 to 20 tons, but the design of pile-driving equipment has kept pace with all requirements. Steam hammers are made in sizes suitable for driving the heaviest of piles, and these have replaced the old drop hammer or monkey. The modern pile-driver is a very efficient tool, capable of handling and driving heavy concrete piles, whether vertical or raking, almost as fast as its predecessor could handle the lighter timber piles.

Although the cost of reinforced concrete has soared lately, in common with all other forms of construction, it is likely to become relatively more economical, as it uses materials that are getting more plentiful rather than more scarce.

Timber construction, on the other hand, is becoming relatively more expensive because the supply of the best timbers is becoming restricted. Turpentine piles in the longer sizes are less plentiful, and use is being made in Australia of some of the cheaper and more plentiful hardwoods, such as blackbutt, after subjecting them to pressure creosoting. The creosote penetrates the sapwood, forming a protective ring around the heart timber, which is relatively impermeable.

It is probable that New Zealand will soon look to its exotic forests for much of the timber required for light marine structures. This is already being used, and its use will increase as the facilities increase for subjecting it to the preservative treatments now available.

For the heavier and more permanent structures, reinforced concrete is now well tried and its economy is established. Some of our earliest wharves, with all their faults judged by modern design standards, have cost less in capital and maintenance charges than any alternative form of construction, and after nearly fifty years' life are still serving their purpose.

In that time much has happened to improve reinforced concrete work and to overcome some of its earlier imperfections. The manufacture of cement to British Standard Specification has removed from the market many inferior cements. Research on concrete aggregates and concrete mixes, improved technique in the making and curing of concrete, and the use of vibrators in the placing of it have all contributed their part in giving a stronger, more impervious and better wearing concrete.

This has helped to reduce slow corrosion in certain parts of the steel reinforcement which has been a feature of marine structures. We have learned to reduce this further by designing our structures with broad, flat under-surfaces, as in flat slab construction, instead of using deep and narrow beams below a thin slab, as was done in earlier structures.

We have not yet succeeded in curing all corrosion in the upper section of piles. This, fortunately, occurs mostly above high-tide level, very little below half-tide level, and not at all below low-tide level, and is therefore comparatively easy to repair. It is, however, a source of expense to be avoided if possible, and alternative types of pile, such as the steel box pile, are sometimes used. It is doubtful if these alternatives will prove more economical, as the reinforced concrete pile is such an efficient weight-carrier.

Mention should be made of prestressed concrete, a modern technique which enables smaller and lighter members to be used, and which has certain other advantages. It can be applied to many structures on a wharf, but it is doubtful if in its present form it would be economical or satisfactory for a heavy wharf structure built in tidal waters.

For breastworks, the masonry or mass concrete retaining wall, used extensively in some of the older ports, has been largely replaced by the sheet-pile breastwork of concrete or steel, which is more economical for the greater depths now required. Sheet-pile breastworks of many different designs are now built, and by the use of a relieving platform it is possible to construct deep-water berths in ground that is not suitable for other forms of construction.

The heavy section of steel sheet-piling now rolled make this available for greater depths than were previously possible, and this material is now used extensively. It is a simple form of construction, and experience has shown that it has an economical life. Recent developments of cathodic protection of steel may extend its life appreciably.

The fendering of a wharf to protect both it and the ship from damage has become more important as the size of the ship and the rigidity of the wharf have increased. The old wooden wharves were flexible structures that could absorb a considerable blow without damage to ship or wharf. The modern concrete wharf does, however, require good fendering.

The most common practice is to drive timber piles at close intervals along the face of the wharf and a short distance in front of it, these being held back to the wharf by chains and sometimes packed off the wharf by steel springs or rubber packings. The use of rubber is growing, and special shapes for this purpose are now procurable.

For more severe conditions, a number of forms of weighted fender have been used, these absorbing the blow from a ship by lifting a heavy weight hung by links from the deck of the wharf. Some of these have proved very satisfactory, but the fenders themselves are costly, and further cost in involved in making provision for them in the wharf structure. Their high cost is warranted only when conditions are particularly severe.

Time will not permit of mentioning all the different ways in which wharves are now built. Some of these are entirely new and are possible only because of new materials, new processes and increasing knowledge of design. Others are developments of methods that have been used for many years.

No one type of construction is applicable to all structures, and designs must be varied to suit conditions. In addition, the engineer is restricted to the use of materials that are commercially available at the time. Because of trade control, currency restrictions and similar modern inventions for the restraint of trade, he cannot always procure the materials best suited to his needs, and he is forced to use other materials and other methods.

Port Development.

Port layout and design have been influenced by three major considerations:

The growth in size of ships.
The introduction of motor transport.
The use of mechanical plant for handling cargo.

Ships have increased in size. The rate of growth has not been steady, having been influenced by two world wars, each of which resulted in an enormous wastage of merchant shipping.

Prior to the first war, growth was very rapid, and increasing draught of vessels was a cause of concern in many ports. Since the second war, increase of draught has not been so marked, but vessels are carrying much bigger cargoes, requiring more room on the wharves for sorting, stacking and delivery.

Replacement of the horse-drawn vehicle by the motor truck has resulted in a greater proportion of cargoes being handled by road as against rail, and this has had its influence on the layout of wharves. Motor vehicles have grown in size, and more room is required for them to manœuvre.

Mechanical plant of all types for lifting and carrying cargo from ships' side to shed and from shed to road or rail vehicle is being used increasingly in place of the old hand truck with manual labour, and has presented its own problem.

Generally the result of these changes has been to require wider quays, wider sheds and wider roadways. To meet these requirements the " breastwork " type of wharf, parallel with the shore line, has obvious advantages over the " jetty " type, but it occupies a much greater length of deep-water frontage per berth, and this is not always available.

New berthage can be designed to meet any reasonable requirements of the modern ship and of modern transport, but berthage built in earlier days will not be of the same high standard.

Fortunately ships are not all of the same size, their cargoes vary in type and in quantity, and for various reasons they discharge and load at varying rates. It is therefore possible to get full use of this older berthage by allocating the available berths to ships according to the nature and size of their cargoes. It is unnecessary, and would indeed be quite uneconomical, to reconstruct every

Ports and Shipping - continued

wharf that will not satisfy the maximum demand of the largest ship.

The capacity of these berths can be increased appreciably by providing stores at convenient positions on the foreshore to which some of the cargo can be taken direct from the ship for sorting and delivery, thus relieving pressure on the sheds at the berth.

It is possible for any modern ship, if it employs sufficient labour, to discharge its cargo from hold to shed more quickly than it can be sorted, stacked and delivered. When this occurs, the berth steadily becomes congested and the rate of work slows down. Ships at adjacent berths will also be hindered by this congestion.

It is therefore not economical to over-man a ship. The quickest rate of discharge will be attained by employing the number of men that will keep the shore facilities working to capacity without congestion.

If a greater rate is desired by the ship, the obvious answer is to work extra gangs overside to lighters, and if cargo is stowed in the vessel when loading with this end in view there will be little extra work or expense in working to lighters. Lighters used as a supplement to shore discharge are an advantage to the ship by increasing the rate of work, thus decreasing the time spent in port, and are an advantage to the port authority by increasing the tonnage that can be handled at each of its expensive deep-water berths.

Ships and Cargo Gear.

Regarding the ships themselves, development has been an increase in size and speed.

At the commencement of the period under review, the time spent at sea on a voyage from Britain to New Zealand was more than the time spent in port, and economy was sought in the reduction of sea time. Developments in propelling machinery, higher steam pressures, water-tube boilers, steam turbines and diesel engines have made this possible, and the time spent discharging and loading the bigger cargoes now carried is the most important factor.

The ship's hold is really a large box in which cargo is stacked in great depth. Because of this, the crane or the winch and derrick are, and are likely to remain, the principal appliances for the general handling of cargo. They are practically independent of size and weight of package, changes of level at which this is stacked in the hold, variations in tide level or height of the wharf or shed.

The ship's winch has changed from the noisy steam winch, with its hissing steam exhaust, to the fast, silent-running and easily controlled electric winch.

Ship's gear is now capable of handling cargo very rapidly, but is not as convenient as the wharf crane, which can pick up and put down its load anywhere within its radius, and thus reduces the effort required to load or unload.

The cost of equipping a wharf with modern cranes is now very great, and their use-efficiency when handling general cargo is low. Economically their installation is difficult to justify for this class of work, but they are used in preference to ship's gear when they are available.

For discharging bulk cargo by grab, the shore crane is faster, and it works at full capacity most of the time.

Specialised Equipment.

Much special equipment has been developed for discharging or loading special classes of cargo, but to justify the cost of its installation it is necessary to have fairly large quantities to handle. In addition, as this equipment usually occupies a considerable amount of wharf space, it requires a berth to be allocated more or less entirely for handling this one class of cargo. For this reason little of this type of equipment is yet seen in New Zealand.

Pneumatic handling of loose granular material is common practice in many overseas ports. The material is sucked from the hold through telescopic flexible pipes and delivered on to conveyors which carry it to where it is to be stored.

Such pneumatic plants for handling grain are made in capacities up to 280 tons per hour. They are frequently mounted on floating pontoons, so that they can be taken from berth to berth, in which case discharge is usually to lighters.

Granular coal is handled by similar plant, and also granular phosphate rock used for making fertilizers.

Where quantities are not sufficient to warrant this special plant, all these commodities can be handled quite economically by grab, as is now done in many New Zealand ports.

The introduction of the self-dumping grab which can be used with any single rope crane has made this possible, and has done much to increase the versatility of the quayside crane.

Some ships are equipped with special gear to suit a particular trade. In some the winches and derricks are replaced by slewing and luffing electric jib cranes at each corner of a hatch. Others have installed elevators for taking fork hoists into the hold, where they stack their load and return to the quay.

Many modern coal carriers and some ore carriers on a regular run have holds of hopper shape and are equipped with belt conveyors and bucket elevators which make them self-discharging. Their cargo pours steadily from the end of a swinging conveyor to a stockpile on the quay, requiring only the minimum of attention.

Mobile plant is now being used on board ship—fork hoists for moving cargo from between decks into the square of the hatch for handling by crane, and bulldozers for trimming bulk cargo to grabs. Scrapers operated by trimming winch are also used for this latter purpose.

Belt conveyors are used for handling small packaged goods, though few ships are equipped with side ports, which are necessary to get the best results from these. Conveyors are, however, used extensively on shore for getting cargo to and from the ship's side, thus allowing it to be stored at some distance from the berth and keeping it clear of other cargo.

Fuel and Oil.

An old feature missing from the modern port is the line of coal hulks moored in some convenient position clear of harbour traffic. These old vessels, some of considerable fame, spent their last years in this undignified but very necessary service, and one or more could usually be seen alongside a ship delivering coal in wicker baskets, to the discomfort of all those on board.

Furnace oil and diesel fuel have taken the place of coal, and the oil barge has supplemented the coal hulk.

Cased oil has also disappeared, and the modern tanker quickly pumps its cargo to shore tanks and departs.

The growth of the oil trade and the general use of oil fuel has presented a problem to port authorities through the spillage of fuel oil and the nuisance it causes.

There is no completely effective way of collecting this, and the best results are obtained by spraying it with certain chemicals which change its character and cause it to sink. If it is very thinly dispersed there is really nothing that can be done other than to let the tide take it out to sea, hoping that it will create little nuisance on its way.

It is an offence to allow oil to escape in harbour waters, for which the master of a ship can be fined heavily; but in a busy port it is not always possible to trace which ship is the culprit.

Where benzine and volatile oils are concerned, spillage is a grave danger to both vessels and harbour installations. Little can be done in such cases other than to confine the spillage by a floating boom until it evaporates. For this reason the greatest possible precautions are taken in the construction and testing of pipe-lines, supervision is very strict during pumping, and pipe-lines are filled with water when pumping is finished. Tanker berths are kept as remote from other berthage as possible, and, where it can be done effectively, the whole berth is enclosed by a floating boom.

Cranes.

In reviewing the development of shore equipment, we find that the revolving jib crane was, and still is, the most favoured appliance. Though specially designed plant can be more economical for special jobs, the jib crane is unquestionably the most adaptable, and it can give very good efficiency at nearly all types of work.

At the beginning of the period under review, electricity was becoming available as a source of power in most ports, and there

Ports and Shipping—continued

was great rivalry between the hydraulic crane, which was then well established, and the newer electric crane.

Electric cranes were at that time simple machines, generally driven by direct-current motors through various forms of gearing, and lowering their load by gravity under control of a robust mechanical brake. They were simple and reliable in the hands of a good operator.

Steady improvement has been made in both performance and ease of operation, and cranes of very long radius and high speeds are now common. Level-luffing was introduced, by which the path of the load remained horizontal while the radius was increased or decreased, and this, together with balancing the dead weight of the jib, allowed higher speeds of luffing.

At this stage the balanced cantilevered jib began to replace the rope-operated strut jib, operation being by crank and connecting rod or by circular rack and pinion. This type is now common for fast-working cargo cranes.

Electrical braking when lowering the load was introduced in place of mechanical braking, and also armature divertor control to give creeping speeds at the commencement of hoisting.

Electrical contactors are now used to handle the main current for all motions of the crane, under the control of light, easily operated master controllers.

Altogether the modern direct-current electric crane is a very advanced appliance. It is light to operate, speed acceleration is automatic, and the load cannot run away accidentally while lowering.

Development of the alternating-current crane has been equally rapid and its performance is now little inferior to the direct-current crane, though it is common to equip an A.C. crane with a rectifier to supply direct current for control circuits and solenoids.

As most power supply authorities now supply only alternating current, there is a definite bias to the A.C. crane, which avoids the cost to the port authority of conversion to D.C. However, the intrinsic virtues of the D.C. motor for this type of load make it preferred by many crane users, and some of the largest ports are retaining direct current for cranes.

I shall not refer to many interesting systems that have been, and are being, developed for the operation and control of electric cranes. Some of these have very good features, but one is apt to wonder if the additional complexity is warranted for cargo-working cranes, and also to doubt the wisdom of taking too much control out of the hands of the operator and making it automatic.

On the mechanical side, progress has been equally marked. High-quality steels are now available for highly stressed parts, advances in machine tools and in workshop practice have produced helical gearing, high-efficiency worm gearing, ball and roller bearings, all of which are now commonly used, with the result that the modern electric crane is a silent, sweet-running machine compared with its noisy predecessor.

Welding is used on many parts of the structure and machinery. Welded tubular jibs are used for some of the very long radius cranes where lightness is of great importance.

The revolving jib crane mounted on a portal or semi-portal travelling gantry, though by far the most common, is not the only type of crane used for cargo-working. The principal variation is the transporter crane used mainly for unloading bulk cargo from ship to stockpile. This type was developed to very big capacities, but is now preferred in smaller but faster-working sizes. The transporter is a very efficient plant for its special work, but where there is any diversity of work the modern revolving jib crane is used in preference to the transporter.

Mobile Plant.

Mobile plant plays an important part in handling cargo from ship's sling to shed and from shed to road or rail transport. It has developed very rapidly over the last few years.

Mobile cranes of compact dimensions mounted on pneumatic tyres and powered by petrol or diesel engines are now used in a wide range of capacities and both slewing and non-slewing types.

The mobile stacking hoist or fork hoist is very extensively used. It is a very useful general-purpose machine, and can lift, travel and stack with great speed. It can be fitted with a wide range of special fittings for handling particular commodities.

Mechanical tractors of compact dimensions and with a very small turning radius are now used for a number of purposes. They are used with trailers in place of the hand truck for cargo which has to be taken any appreciable distance or is of awkward shape or size. They have replaced the capstan for shunting railway trucks on the berth. Self-propelled trucks are also used in some ports.

All the types of mobile plant mentioned are available in electric models driven by storage batteries, and in certain circumstances, particularly where there is not much travelling from place to place, the electric model has definite advantages.

For general use, the petrol, petrol-electric, diesel or diesel-electric drives are most used, as this provides an almost unlimited operating range, and makes them most suitable for port work.

The introduction of this type of plant has naturally had its effect on the layout of wharves and sheds.

Previously a few hand-operated cranes of capacities up to about 10 tons were provided at appropriate positions on the wharves to take the occasional load that could not be levered or parbuckled on to a vehicle.

These have disappeared, and in their place the mobile crane or fork hoist goes to the load and quickly disposes of it as required.

To allow the maximum use of this plant, the wide single-storey shed without interior columns, with good clearance under roof principals and with high doorways is preferred, and loading banks or cart docks are either reduced in number or dispensed with.

In many places, mobile plant has replaced the overhead travelling crane, as its mobility allows extra plant to be brought to any point during busy periods and the whole of the plant to be taken elsewhere when work is slack. The headroom taken up by the overhead crane usually prevents the two types of plant being used together.

The use made of quayside cranes, mobile plant and other mechanical appliances for handling ships' cargoes varies greatly in different ports, according to local conditions, local customs, type of labour available, and method of stevedoring.

These matters have to be taken into account when installing wharf equipment, as it is by no means certain that a particular type of plant used successfully in one port will be equally successful in another where conditions or customs may be different.

(To be continued)

Correspondence

To the Editor of *The Dock and Harbour Authority.*

Sir,

May I please make an appeal to your readers on behalf of the Royal Engineers Transportation and Movement Control Museum at Longmoor Camp, which many of them may have seen.

Much work has been done on this Museum in the past six years and it is now beginning to show signs of progress. We are, however, still in need of more exhibits and particularly of a type suitable for display in show cases, but we will take any articles, maps, photographs or documents. All exhibits should be accompanied by a short story explaining the origin of the exhibit.

The Museum at Longmoor Camp does not in any way compete with the main Royal Engineers Museum at Chatham. We are interested only in those branches of the Corps which are trained at the Transportation Centre and wish to bring our records up-to-date before they are irretrievably lost. In this we must rely on information sent us by any interested person. All exhibits must have a direct relationship to Military Railway, Docks, Inland Water Transport or Movement Control activities in any part of the world.

In addition to the historical side of the Museum, we also try to depict the various sides of our work for the benefit of visitors and our new recruits.

Any exhibit will be gladly received by the Commandant, Transportation Centre R.E., Longmoor Camp, Liss, Hants, and, when put on view, the donor's name will be displayed.

Transportation Centre, R.E., Longmoor Camp.
6th December, 1954.

Yours faithfully,
(Signed) C. H. BARNETT,
Brigadier Commandant.

Antwerp Entrance Locks

Rapid Progress of New Construction

The swelling traffic of the Port of Antwerp has latterly, in certain trade circles, aroused misgivings and criticism regarding delays, or possible delays, in the sluicing of the Rhine and Inland barges. Normally there are always some craft which, on account of various circumstances such as weather conditions and the need of several stops en voyage to discharge parcels of general cargo to ships moored in the River Schelde, arrive at the dock entrances at an unfavourable time for sluicing. Such occurrences are not unusual on any waterway but now at Antwerp with the increase in volume of seagoing and inland traffic there is unavoidably a proportionate increase in these hold-ups.

Mr. Oscar Leemans, the general manager of the port, in early 1953 foresaw this difficulty as likely to occur as a result of the inauguration of the oil refineries traffic and the spate of the engineering rehabilitation of the port services. The extra demands upon sluicing for the massive constructions within the docks whilst only temporary have also placed greater stress upon the circulation, and the bottleneck at the existing bascule bridge between the Leopold and Albert basins has also added to the difficulties.

However, these matters are having close attention and the anxiety of the shipper about the free and expeditious flow of traffic between the river Schelde and the wet docks whilst understandable is needless. Within a few months the heavy construction demands will have slackened and a new lock will have become available. As a matter of fact the speed of engineering progress on the works of construction, etc., in the port of Antwerp is second to none.

The present state of sluicing arrangements is served by four existing lock entrances (Fig. 1). (1) Buonaparte lock, (2) Kattendijk lock, (3) Royers lock, and (4) Kruisschans lock, and in the autumn of next year the new Baudouin lock (5) will come into service. Numbers (1) and (2) with water depths of 8.5-ft. and 10.5-ft. at M.L.W., respectively, are mainly in use for barge traffic although, of necessity, by the payment of a fixed due urgent barge traffic can be sluiced through at the Royers lock, which has the dimensions of 594-ft. length, 65-ft. width, and 21.75-ft. depth at M.L.W.

It is held as a further cause of complaint that the Buonaparte and Kattendijk locks are too old: the former was built 140 years ago and the latter nearly 100 years ago: the time taken up in sluicing is too great and more modern locking arrangements are urgently necessary. To some extent this point is justified; but there again one cannot isolate it from other factors in the system of circulation, with which the port engineers are striving energetically to cope. There is the congestion of barges in both the Buonaparte and Kattendijk docks, and the bottlenecks of the intercommunications. To deal adequately with the problem, authority, funds and labour must be available in plenty to allow of complete modernisation and expeditious completion without the interruption of traffic. The future projects have indeed left the drawing board.

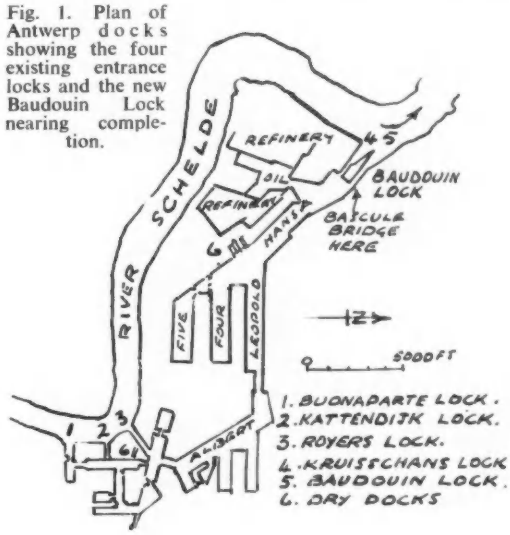
However, the existing position is not so difficult or threatening as some would have us believe. The old locks have done, and are doing, a tremendous amount of useful service and, above all, competent hands and brains are directing measures for the most productive good. There is another factor which shippers sometime fail to appreciate to the full and that is the waterway circulation must, in these days, be fully co-ordinated with road and rail land traffic on equal terms.

It is as well to bear in mind that during these last two years the massive works of the new Baudouin Lock have imposed on the contractors the excavation and transport from site of about 2,000,000 tons of spoil and the handling and transport of 700,000 tons of concrete material, sand, gravel and cement, apart from the large amount of heavy construction plant, required in the undertaking.

Baudouin Lock.

The new Baudouin sea lock which is progressing rapidly towards completion has several interesting features of constructional ingenuity and economy. It is sited about 800-ft. north of the existing Kruisschans lock and parallel to it as shown in Fig. 2. It has been excavated and constructed in the dry; well point and sump drainage being used as required, aided by cut off screens

Fig. 1. Plan of Antwerp docks showing the four existing entrance locks and the new Baudouin Lock nearing completion.



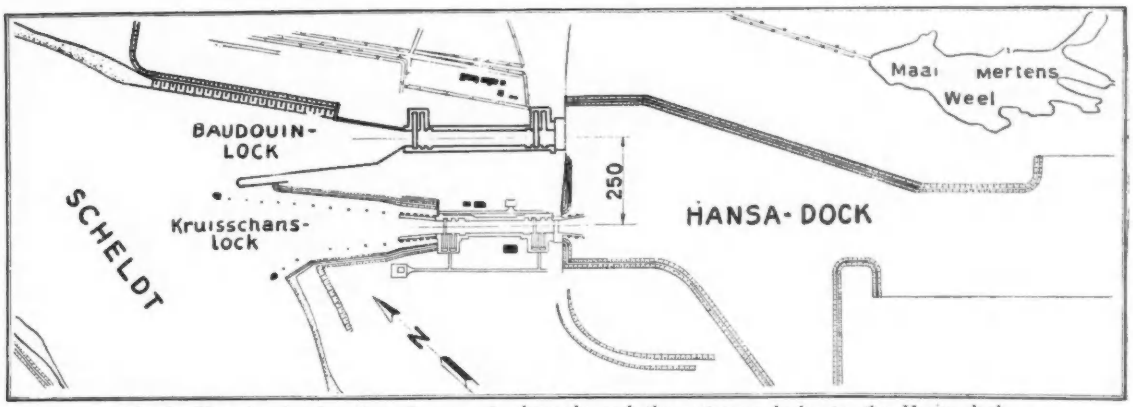


Fig. 2. Plan showing location of approach channels and the entrance locks to the Hansa dock.

of steel sheet piling. The main dimensions are: length overall, river face to dock face, 1,404-ft.; maximum length between gates, 1,181-ft.; basin width, 147.6-ft.; depth from dock water level to basin floor, 47-ft.; freeboard above dock water level, 13-ft.; and height of wall from basin floor to coping, 60-ft.

On the Hansa dock side there is a further extension of 128-ft. for the abutments of a bascule bridge (Figs. 2 and 3), which carries rail tracks and roadway connecting up with the port circulation systems.

The body of the lock is designed as two parallel opposing reinforced concrete cantilever walls, without counterforts and autostable, spaced 147.6-ft. apart between vertical faces, as shown in

Antwerp Entrance Locks—continued

cross section AB (Fig. 3). The wall height is 66.5-ft. from the underside of footings, which are 46.5-ft. wide, the toe projecting 12-ft. forward of the vertical face. The wall is 14.5-ft. thick at the root which is 16.5-ft. above the footing base. The top surface of the footing slopes down to the toe and the heel where the thicknesses are 8.5-ft. and 6.5-ft. respectively. The toe abuts against a steel sheet piling curtain wall driven to 16-ft. below foundation grade, for the full length of the wall, into the compact fine sand of the sub-foundations, which offered resistance to driving of 1½ tons per square inch at this grade. The wall thickness at the

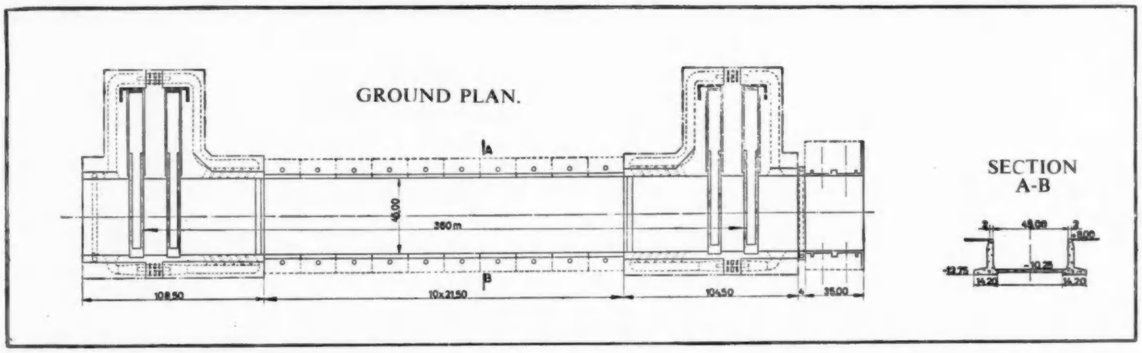


Fig. 3. Arrangement of the New Baudouin Entrance Lock showing filling and emptying aqueducts in dotted lines.

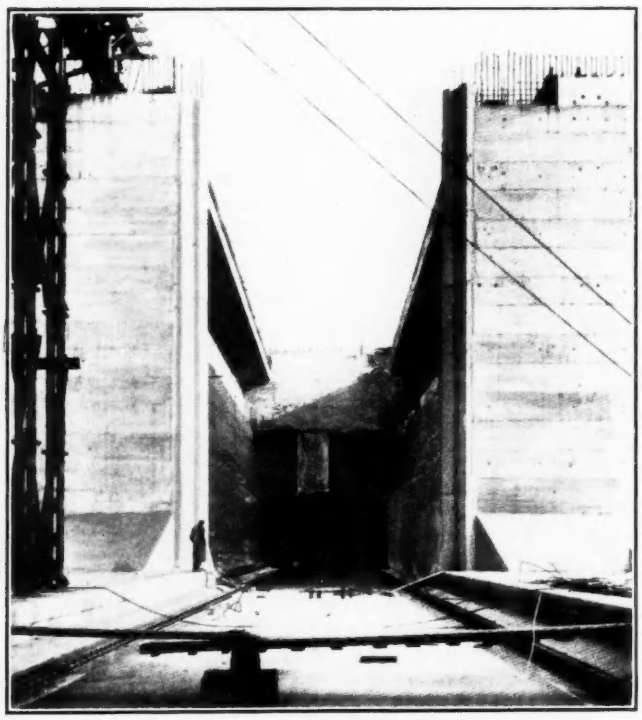


Fig. 4. Photograph of cills and withdrawal chamber for a box caisson Lock gate nearing completion.

top cope level is 6.5-ft., where on the basin edges it is protected by a rounded steel moulding.

Between the toes of the two walls and the sheet pile curtain walls the reinforced concrete floor of the basin was laid to a thickness of 3.25-ft. on a 2-ft. thick mattress of sand and gravel. To prevent uplift pressure on the underside of the floor the slabs have been furnished with 6-in. diameter vent pipes filled with gravel. For construction convenience and provision for temperature changes the walls were provided with expansion joints at 71-ft. intervals of which there were 11 in number making up the full length of the basin wall (710-ft.) between the massives of the gates' heads.

Lock Entrance Heads.

At each end of this box shaped shell huge monolithic masses of reinforced concrete were constructed to provide housing and sills for retractable box caisson gates fitted with rollers. The overall dimensions of the gates are: 154-ft. long, 28.25-ft. wide and 61.6-ft. high from sill to platform level. There are four gates, two at each end and all placed on the north side of the basin, they are designed to take full hydraulic pressure on both sides and each carries two sets of roller bogies, the forward, or outer, set is fixed to the bottom and runs over the track of the apron between the two sills. They are placed 25-ft. from the forward bulkhead and immediately over them there is a water-tight cupola with open bottom, from the top of which there is an access shaft extending to the upper deck and terminating in a compressed air relief chamber. This is used for inspection and the maintenance of the wheels in satisfactory order. The lower tracks are at 20-ft. centres laid on the apron between the two cills (Fig. 4). The other set of rollers at the rear are fixed at a level of 5-ft. below upper deck, bracketed to the rear bulkhead of the caisson gate with the centre bogie 10-ft. from the face. The track of the wheels is laid on ledges of the lateral walls of the withdrawal chamber.

To obtain the necessary ease of movement to open or close a gate water ballast is used. Filling or emptying is done by compressed air pumps under the control of the operator. The operation of opening and closing the gates is done in three minutes.

The withdrawal chambers into which the gates are retracted are 168-ft. long, 28.25-ft. wide at the entrances increasing to 34.5-ft. between lateral walls for the remainder of the length. This increase of width is to provide ample space to repair or overhaul the skin of the caisson when occasion demands. At the narrowed entrance the gate abutments are faced with granite. There is also a vertical groove at the entrance of each chamber, in both walls, to facilitate the temporary closure by the insertion of a steel bulkhead. When this is sealed the chamber can be pumped dry, and any repairs to the gate can be then carried out in open air. Since each gate is 800 tons weight provision is made to take the weight off the rollers by suspending it from the upper track ledge, temporarily, with specially designed brackets, before complete emptying of the chamber.

The reinforced concrete division walls between the twin chambers are 40-ft. wide and the apron floor of the basin between is 15-ft. thick. All the sills are granite faced.

The filling and emptying of the dock is conducted at each end by two galleries shown dotted in Fig. 3 of 16.5-ft. wide and 18-ft. high section each controlled by two rolling gate valves. The water passes through a balancing chamber 100-ft. long by 16.5-ft. wide and 19.5-ft. high, from which it passes into the lock through six openings, each 13-ft. by 6.5-ft. with deflecting walls as shown. These openings are near the floor which, in front of them, is depressed to 4.5-ft. lower than the main floor of the basin with the intention of reducing the force of the cross current and allowing the full area of the basin to be used. The time of filling to maximum range is computed at 15 minutes. The valves and the gates are manoeuvred electrically.

At the Hansa dock end of the lock (Fig. 1) the abutments to carry the bascule bridge are constructed as shown in plan to the right hand of Fig. 3. This bridge carries a roadway 24-ft. wide and the rail tracks linking up with the port system.

The contractors for the lock construction were Pieux Franki and the Chief Engineer for the Port of Antwerp, Mr. E. Vuylsteke.

R. R. M.

The Handling of Bulk Cargoes

Unloading from General Cargo Vessels

By E. S. TOOTH.

The task of the discharging agent whose work is confined to a regular traffic or a regular line of vessels is comparatively straightforward. Once the handling of a particular type of goods is mastered and once the idiosyncrasies of the construction of a particular line of ships are known, most of his problems are solved and his main job is to keep the work at a high standard.

The discharge of miscellaneous goods from a wide and ever-changing variety of cargo vessels, however, is more complicated and in this sphere the discharging agent is likely to be presented with new problems every week. The solving of these calls for initiative and enterprise but the extra effort thus expended is often compensated for by the much greater interest of the job.

Special Berths and Special Bulk Carriers.

Bulk cargoes when stowed in specially built bulk carriers of any type can usually be unloaded quickly and straightforwardly, particularly since such vessels are usually self-trimming. When stowed in general cargo vessels, however, they are notorious for the variety of problems they present, a point which was emphasised in the article on the discharge of bulk sugar which appeared in the March, 1953, issue of this Journal. Each type of bulk cargo, be it sugar or asphalt rock, scrap iron or manganese ore, requires a special handling technique. When the traffic is a big and regular one, i.e. of the same material in the same type of ship at the same berth, difficulties once overcome do not often recur, for in such cases the berth is usually adequately equipped with heavy-duty grabbing cranes, special grabs and often with hoppers, conveyors and other appliances which, although having to be brought up to date from time to time, may not have to be altered fundamentally over a very long period. An example of a berth specially constructed for handling bulk cargo is that recently brought into commission at the Tyne Dock by the Tyne Improvement Commission for discharging iron ore*. With five heavy-duty grabbing cranes, its capacity is about one million tons of ore annually.

As already stated, it is the discharging agent who has to discharge part and sometimes full freights of bulk materials from general cargo vessels, who meets most difficulties in handling this traffic. They arise from the construction of the vessel, the inherent nature of the commodity, its stowage in the ship's hold and the fact that ship's gear and general cargo cranes (i.e. not grabbing cranes) must be used.

To emphasise the extent of the difference between general cargo vessels and ships built specially for carrying bulk, two examples of the latter are given. The first is the "Carl Schmedeman" which is used by a Jamaica mining firm to carry bauxite from Jamaica to the United States. It is claimed she is the first vessel to carry her own automatic discharging gear. Conveyor belts pass beneath the holds, and a total of 152 gates, when opened, release the ore. When moving, the belts feed the ore to other conveyors which carry it ashore at 1,400 tons per hour.

The second example is the single-deck bulk sugar carrier specially designed for a ship-owning subsidiary of the United Molasses Co. Although sugar is intended to be the primary cargo for these vessels, they have been designed with a view to carrying any type of bulk cargo from heavy ores to light grain. The machinery has been placed aft and the hull has been designed with two longitudinal bulkheads running from the engine room to the forward bulkhead of No. 2 hold. The vessels have an overall length of 460-ft., a 61-ft. beam, a 24-ft. 6-in. draft and they can carry 9,000 tons of bulk cargo.

Facilities at a General Cargo Berth.

Ores from South Africa and sugar from the West Indies provide two current examples of bulk commodities carried with general goods in conventional cargo vessels. Stowed on top of and around the parcels of ores may be bales of wool and skins, bales of tobacco, cartons of canned goods, casks of wines and bags of beans. To be discharged from the West Indies ship concurrently with bulk sugar may be hogsheads of rum, barrels of asphalt, bales of bagasse, pieces of timber, bags of spice and logs of greenheart. Thus general cargo (or "piece") cranes are essential.

In planning the unloading of his bulk from the general cargo vessel with its comparatively small hatchways, its 'tween decks, trimming hatches, alleyways, deep tanks, propeller shaft tunnel and so on, the discharging agent must first consider the type of purchases at his disposal. On the quay in a modern British port he will probably find general cargo cranes of perhaps 3 or 5-tons capacity and 60/80-ft. radius, electrically driven, level luffing and self-propelling. Such cranes will be excellent for handling wool, rum, greenheart logs and so on, but they are not, of course, grabbing cranes. To discharge his bulk, he will therefore have to use ring discharge or self-dumping grabs. The ring discharge grab cannot, however, be rigged simply on a level luffing crane required for intermittent use for piece goods. Suspending the ring from the jib-head tends to throw the jib into excessive bending and a more complicated arrangement involving a number of sheaves is necessary. Moreover, difficulty with the ring discharge grab often

Fig. 1. Westwood "multi-blade" grab, fitted with special flexible connections, handling scrap metal.

arises because of the different levels involved in working from stowage to barge, hopper, or maybe railway vehicle on the quay. The self-dumping grab is very often the most satisfactory alternative but, because of its snatching action, the maximum permitted weight of grab and load will probably be 45/48 cwts. on a 3-tons crane and 75/80 cwts. on a 5-tons crane. This matter, by the way, is covered by a British standard.

The special nature of the work of unloading bulk cargoes from general cargo vessels can perhaps best be made clear by taking an example or two. Bulk sugar was chosen for the article already mentioned because, besides being particularly interesting, it is a comparatively new traffic and presents new problems. Knowledge of handling it certainly does assist in the discharge of other bulk materials; and those with which the stevedoring contractor has to deal in general cargo vessels include such goods as asphalt, bauxite, chrome ore, copra, grain, ground nuts, ilmenite, kieserite, kyanite, lepidolite, manganese ore, phosphate rock, pig iron, rock salt, scrap metal and sulphur. The main inherent differences in the commodities are in the sizes and shapes of the pieces and in how freely the material "runs." These factors affect both grabbing and trimming.

Bulk Scrap Metal.

As has already been indicated, many of these commodities bring problems of their own. Scrap metal, which is certainly one

* An article describing the new Iron Ore Berth at Tyne Dock, South Shields, appeared in the May, 1954, issue of this Journal.

The Handling of Bulk Cargoes—continued

such commodity—being particularly awkward to handle—has recently been imported into this country from places as far apart as the Far East, the Near East, and the West Indies. Consignments run into hundreds of tons each—sometimes they are over 1,000 tons—and consist of pieces varying in size and shape from something like 1-in. cube to almost anything—strapping, rods and bars, bedstead parts, railings, bicycle wheels and motor car parts.

Particularly when stowed under deck (as it frequently is), bulk scrap metal can be very slow working. When handled in the hold manually, speeds of discharge are sometimes as low as 4 tons per gang per hour (despite adequate incentives) and often the stowage or the type of scrap prevents the employment of more than one gang in the same hold.

The handling means employed include shovelling the smaller pieces into buckets or skips and slinging the bigger pieces, after breaking them out with crowbars. Occasionally the latter are piled into cargo nets but the wear and tear on these is extremely heavy. Bucket grabs, even when fitted with teeth or claws, are not effective on this commodity—they fail to pick up a reasonable load. Moreover, they are not always safe. Electro-magnetic appliances would in some cases solve the discharging agent's problem but since the ship's compass is likely to be affected by their residual magnetism, they are not popular with ships' masters. They are, however, effective appliances which are used for ocean ship discharge more extensively in the U.S.A. than in this country.

A satisfactory appliance for much of this work is the "octopus" or multi-blade grab fitted with special flexible connections (Fig. 1). On a crane of 3-tons capacity, working speeds for many types of miscellaneous scrap metal may be 12/16-tons per hour—three times or more the speed of the alternative manual method. Again the fastest working type is the power grab (for one thing it is usually larger) but the stevedore who is forced by circumstances to employ the ring discharge or self-dumping type of grab usually obtains the outputs mentioned. High outputs are only achieved, of course, whilst there is a good bulk of scrap metal upon which the grab can work; hence trimming is again of utmost importance. When the bulk under deck has been reduced to reasonable dimensions, in some instances the balance can be trimmed into the square of the hatch mechanically—by a dozer, for example.

It should be mentioned here that although emphasis is placed on speed, it is also imperative that adequate consideration be given to safety. Whether the scrap is being taken over the ship's side by bucket, skip, net, magnet, sling or grab, there is always some risk that pieces may fall from the appliance anywhere in the path along which it travels.

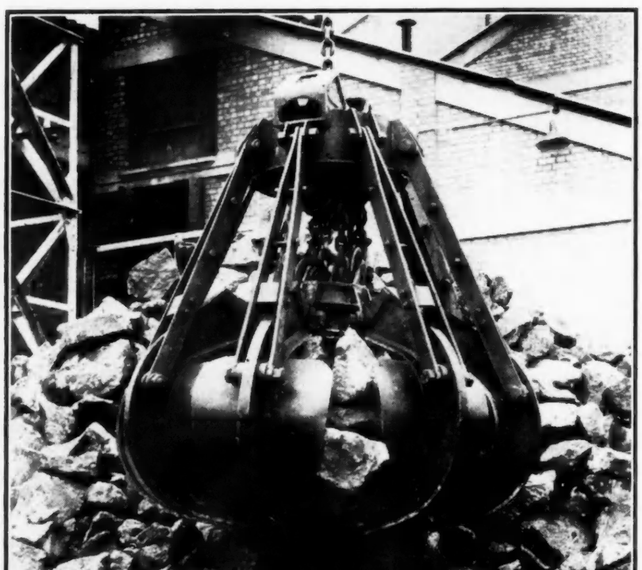


Fig. 2. Westwood "multi-blade" grab, being used to handle rock asphalt.

Fig. 3. Muir-Hill hydraulic loader trimming ore in a ship's hold.

Trimming.

Some bulk commodities, such as sulphur, can be handled with the same conventional type of bucket grab as is used for sugar; but chrome ore, for example, which is usually imported in lumps of various sizes, again requires a special appliance. In discussing the handling of this and similar commodities, opportunity will be taken to make further reference to trimming.

The fact that a fair proportion of any bulk goods carried in a general cargo vessel is often in or under 'tween decks is the primary reason why trimming machines are essential to speedy discharge. A typical stowage example would be a consignment of, say, 1,500 tons asphalt rock or of chrome ore, stowed in two or possibly three holds of a vessel having 'tween decks and perhaps shelter decks. In such a ship, the material will have been trimmed at loading so that in each hold more than half of it will be under deck. The top of the bulk will be below 'tween deck level. The whole will probably be covered with tarparlins; and other goods, piece goods, will be stowed on top of them.

After removing the sheets, the stevedore will set to work with a special grab, to clear the square of the hatch. A suitable appliance for asphalt rock and similar commodities is the "octopus" grab illustrated in Fig. 2. The size used will, of course, depend upon the capacity of the purchase available. At the same time as the square is being emptied, as many trimmers as is economical are employed in the hold. These men will work to a dual-purpose plan. They will see that the grab is properly fed with material and they will make working space for a trimming machine (probably a bucket loader) as quickly as possible. Fig. 3 shows a Muir-Hill bucket loader trimming cargo in a ship's lower hold.

As soon as working space has been made for it, the trimming machine will join the manual workers in their effort to supply the grab with an adequate volume of material to make its continued operation worth while. Sooner or later, however (dependent to some extent upon the efficiency of the organisation and also of the gang itself) it will no longer be economical to grab the material and resort will be made to the skip or metal bucket method. At this stage, the mechanical loader is again particularly useful. Where there are no trimming machines, the skips or containers often have to be filled under deck and either dragged or, in certain cases, wheeled to the square of the hatch. A bucket loader, which is one of the most manoeuvrable types of trimming machines, can usually take the material from its remote stowage and tip it into the skips speedily enough to keep the purchase

The Handling of Bulk Cargoes—continued

working as fast as it is able. The maximum output by the skip method is thus obtained, for the machine properly fills each container and there is no risk of loss of contents due to drawing it under plumb.

There are many appliances suitable for trimming—dozers, overhead loaders, mechanical scoops and shovels and so on — the majority of which were certainly not first constructed for work in a ship's hold. These machines can, of course, be used in a variety of ways, not all of which are conventional. In fact, in ship discharge generally, and certainly in connection with the discharge of bulk materials, there is frequently need for improvisation if good outputs are to be obtained. However Heath-Robinsonian the method tried may be, if it pays dividends it is certainly worth while. Sometimes a new and useful practice originates from what at first appeared to be a wild experiment. There is still much to be learned in the field of trimming in ship's hold.

Factors Important to Speed.

To sum up, any problem in ship discharge must, of course, have some connection with speed of working—and the quick turn-round

Fig. 4. A new type wire-rope operated self-dumping grab, made by Priestman Bros. Ltd., handling bulk sugar.

of vessels has never been more important than it is to-day. Prior to the second world war, shipowners spent some forty per cent. of their outlay on ships in port; now the proportion is calculated at fifty per cent. to seventy per cent. Time in port must be reduced and it is clear that, whatever the bulk commodity in the general cargo ship, there is a number of factors which, given careful attention, will appreciably affect the speed of discharge.

The first in importance is trimming in holds. Mechanical appliances, when suitable and used intelligently, can do this work ten times as quickly as manual labour—but there must be careful planning to ensure that trimming keeps the grab working at maximum speed for as long as possible after the commencing of discharge. The next factor is the proper employment of the grab. The surface of the bulk must be kept reasonably level so that the grab remains upright when lowered on to it. With this point in mind—and it is important, particularly with self-dumping and ring discharge grabs—the grab should be so constructed that its centre of gravity is as low as possible. Fig. 4 is an illustration of a self-dumping grab of this type, made by Priestman Bros. Ltd. Wire-rope operated, it has been found to bite exceptionally well into bulk sugar.

Grabbing must also be done in accordance with the plan to give the trimmers the best opportunity to keep it adequately served for the longest possible period. Placing cranes is another job which must be done meticulously. The shorter the luffing and slewing motions the crane has to perform, the greater the number of grab loads it will handle per hour. Sometimes specially constructed hoppers, with an outlet feed to barge or vehicle on quay, are placed on deck for the specific purpose of reducing the distance the loaded grab has to travel. Cranes are preferred to derricks on bulk work because they can vary their plumb. Delivery to lighter by crane, of course, normally involves working the lighter between ship and quay, but the employment of a hopper on deck can obviate this and allow the barge to be placed " outside " the ship.

The " briefing " of the hatchwayman is also of importance. Proper signals by him to the crane driver ensure: (1) that the grab is lowered at the precise spot required; (2) that it lands upright on the bulk; (3) that it does not hit the ship on its way into or out of the hold; and (4) that it is not used in a manner which involves a working risk particularly to the men in the hold; all essential factors in speed.

It will be appreciated that a general cargo vessel is particularly vulnerable to damage by the heavy mechanical appliances which have to be used for the work of discharging bulk. Hatch cover ledges, hold ladders, sounding pipes, shifting board channels, stanchions, tank covers, beam sockets, ceiling boards and even propeller shaft tunnel can suffer damage by a swinging grab, especially when it is loaded. Trimming machines are apt to damage any fittings—eyes, rings, cleats, bolts—which protrude above deck or ceiling level and anything else vulnerable (a spare propeller, for example) which is covered by the bulk. Care by the signalman, the crane- and winch-drivers and the trimming machine operators can lessen the damage risk; if the stevedore consults with the Chief Officer of the vessel before discharge commences, he can often take steps which will reduce it still further. Damage not only costs money to repair, it sometimes delays the sailing of the ship.

The discharging agent's comprehensive plan for the vessel takes into consideration the principal points which have been mentioned. Exact knowledge of the stowages and, if possible, condition, not only of the bulk materials, but also of the consignments of piece goods, must be obtained before the respective parcels are reached in the hold; the necessary handling appliances must be assembled and their working condition checked. Spare grabs particularly must be available, so must Engineering staff. In a piecework port, all question of manning and of piecework rates should be cleared up well before the various jobs are started. With consignments of bulk, particularly in general cargo vessels where such varying amounts of trimming are necessary, these questions can be controversial. Efforts should be made to ensure that barges and vehicles will not only be in attendance but will be ready (uncovered, swept, etc.) to start work immediately the gang is ready. There must be no hitch about outlets.

Finally, the work of discharging these bulk cargoes is not fully organised just because the gangs have begun work with adequate equipment. If the speediest turn-round is to be given, there must be prompt starts and a full working day—matters not always given sufficient attention. There must also be a sympathetic alertness to the progress of each gang, not only because unusual conditions, involving claims for special pay allowances, may be met as discharge proceeds, but also because the possibility of these arising must be appreciated early enough for action to be taken to minimise their effects. In this connection it is stressed that attention paid at the time of loading can have appreciable effect on speeds of discharge. The wise shipowner constantly has this in mind and ensures that his loading agents and the Chief Officers of the vessels of his fleet bear it in mind also. In ship discharge, threequarters of the discharging agent's battle is to see difficulties before they arise and to plan them almost if not quite out of existence. It is essential, therefore, that the loading stevedore is his ally.

The Port of Honiara in the Solomon Islands wsa recently visited by Col. P. A. J. Hernu, Chairman of the Port of Colombo. At the request of the Government he is to make recommendations concerning the further development of the port.

New Wharf at Port of Tiko

Reconstruction Works in British Cameroons

(Specially Contributed)

As is probably well known, the British Cameroons in West Africa produces a very large quantity of bananas, and these are exported through the small port of Tiko, which port is operated by the Cameroons Development Corporation. This Corporation is also responsible not only for a large percentage of the banana estates, but also for the production of rubber, palm oil, cocoa and other commodities. In 1953 close on six million stems of bananas were exported, of which some four million were grown on the Corporation estates.

In 1951 the Cameroons Development Corporation became perturbed at the condition of the wharf at Tiko. This wharf, which was built by the Germans in 1911, was of cast iron screw pile construction, being 400 feet long and 33 feet wide, the depth of water alongside being 20 feet below L.W.O.S.T. The Corporation's Consulting Engineers, Messrs. Coode & Partners, were called in in May, 1951, to advise on the best method of repairing or reconstructing the wharf.

It was found that many of the cast iron piles were fractured and that the wharf was in danger of collapsing. The illustration (Fig. 1) indicates a fracture in one of the cast iron piles of the existing wharf. This type of damage to the piles is due to design adopted. It will be seen from the photograph that the cast iron piles are capped with a plate, on the upper side of which two lugs project. The main transverse joist rests on the plate between these two lugs, but the joist is free to slide on the plate. Consequently, when a ship was berthed alongside the wharf, the full blow from the ship was transferred through a floating fender to the front row of piles. As the transverse joists were not connected to the head of the pile, the blow was not transferred, as is modern practice, to the piles in the middle and back rows. Furthermore, the bracing between piles, both transversely and longitudinally, consisted of T-section members placed diagonally. Where two members crossed they were not bolted together, and were consequently quite free to buckle, as they had done in many cases. It was, therefore, a question of reconstructing the wharf rather than repairing it.

In considering the most suitable method of reconstruction, the consulting engineers had to bear in mind that the export of bananas must continue, which meant that any reconstruction work would have to be carried out during the rainy season—that is, May to August inclusive—when the tonnage of bananas to be loaded was small, and could therefore be dealt with by lighters to the export vessel moored in the stream.

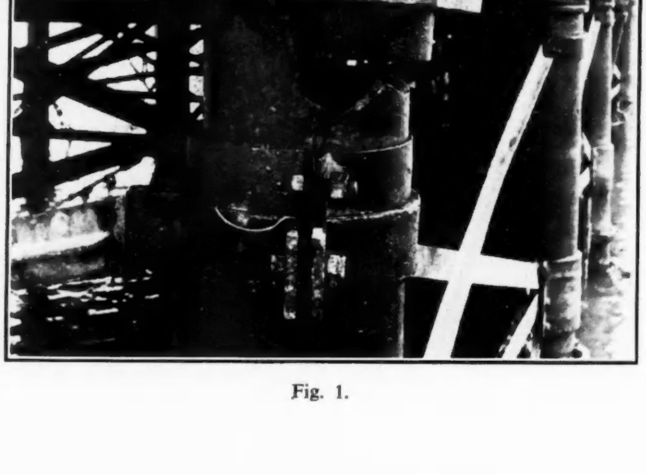


Fig. 1.

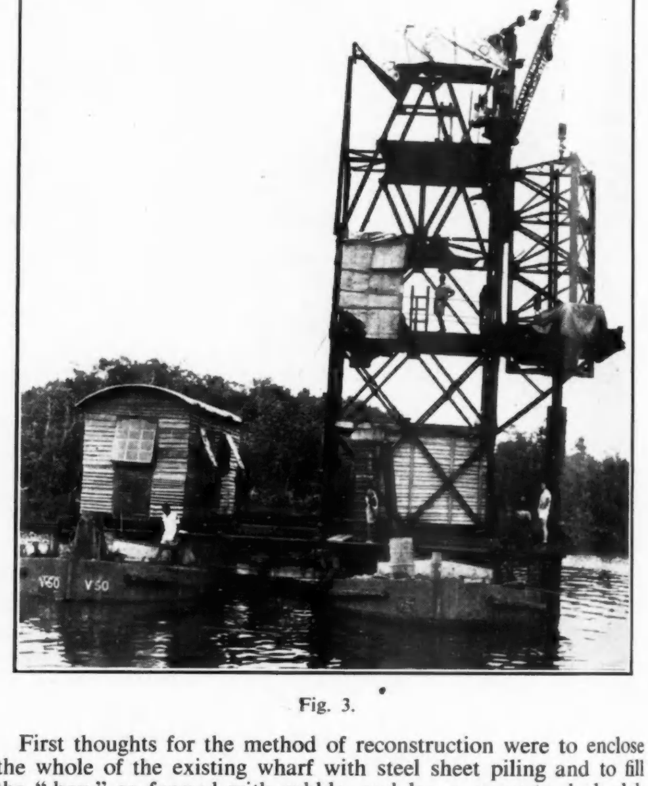


Fig. 3.

First thoughts for the method of reconstruction were to enclose the whole of the existing wharf with steel sheet piling and to fill the " box " so formed with rubble, and lay a concrete deck slab over the top. Borings, however, showed that the strata of the river bed consisted of soft clay, which meant that the length of sheet piles required would have been uneconomical and difficult to brace. After several other methods had been considered and rejected for various reasons, it was decided to construct a new wharf in front of, and immediately adjacent to, the existing wharf. Since the old wharf would be out of commission not only for loading export ships, but also lighters, it was decided to construct in addition a lighter wharf. By this means the lighter wharf could be completed during the height of the export season without interfering with the loading of bananas from the old wharf, and would then be available during the off-season whilst the new wharf was under construction.

Due to the nature of the river bed it was decided that some form of screw-pile would form the most satisfactory method of construction. Cast-iron or steel screw-piles, in the waters of the river at Tiko, would require continual maintenance of the bracing members, and finally Messrs. Braithwaite & Co.'s " Screwcrete " pile was adopted, with a superstructure of reinforced concrete, all longitudinal and transverse beams being kept above low water level.

The layout of the new works and their relation to the existing wharf is shown in the Plan (Fig. 2). Both the main and the lighter wharves were designed for a deck loading of 3 cwt. per square foot, and to allow the use of 3-ton mobile cranes and steam and diesel locomotives with a total axle load of 20 tons. The lighter wharf was also to be provided with three 3-ton and one 7-ton fixed cranes. The main wharf had to allow for a berthing impact from

New Wharf at Port of Tiko—continued

vessels up to 6,000 gross tonnage (i.e. 12,000 tons displacement) approaching at a speed of one knot, and the lighter wharf had to allow for a berthing impact from vessels up to 100 tons displacement at the same speed. The design also had to allow for four bollards on the main wharf, the pull on the bollards being 35 tons, and one bollard on the lighter wharf for a pull of 64 tons. Two capstans, on the main wharf, each with an 8-tons pull, were allowed for in the design.

Lighter Wharf.

The lighter wharf is 398 feet long and 30 feet wide, with a depth of water alongside of about 8 feet at L.W.O.S.T. The wharf was constructed of three rows of 22 inches diameter, screwcrete piles at 11 feet 6 inches centres transversely, and 18 feet centres longitudinally. The piles had cast iron screws 5 feet 6 inches diameter fitted with a reinforced concrete nose. The outer casing of the pile consisted of mild steel corrugated sheeting 2 mm. and 3 mm. thick, and the casing was built up to the required length by welding together sections 3 feet 10 inches long. The pile was screwed by means of an electric capstan on a floating screwing tower, the cast iron screw being turned by means of a 6 inches diameter mandrel driven by the capstan.

The photograph (Fig. 3) shows the floating screwing tower being prepared to screw a pile. The pile casing has been lowered into position and the mandrel may be seen projecting above it just below the cantilevered platform. One of the two 5-ton cranes on the screwing tower can be seen lowering the triangular frame through the cantilevered platform on to the mandrel, and it is this triangular frame which is revolved by the capstan, in turn revolving or screwing the mandrel and with it the cast iron screw. The casing automatically follows the cast iron screw to which it is bolted.

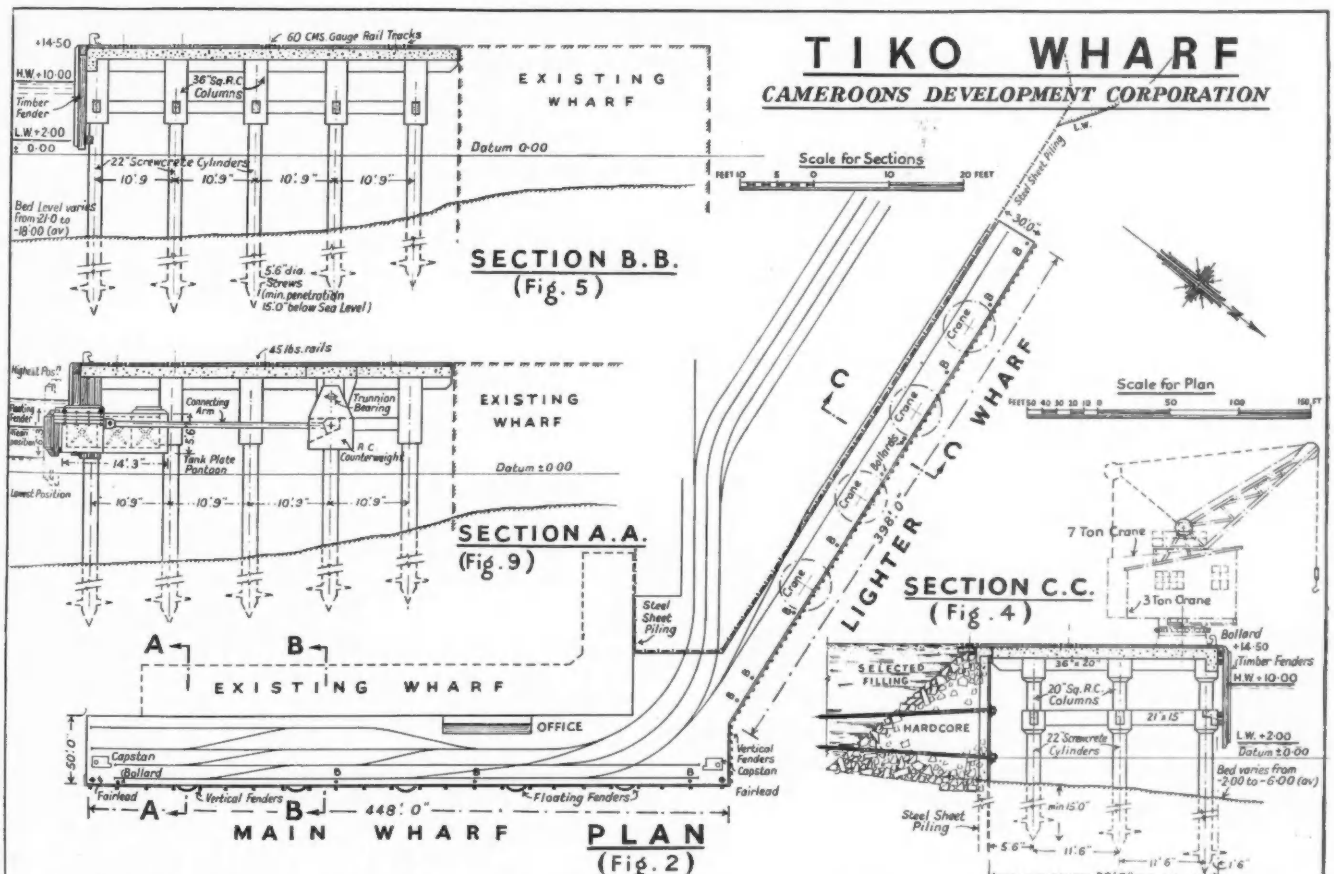
After the pile had been screwed to the required depth, with a minimum penetration of 15 feet, the mandrel was withdrawn and a prefabricated cage of reinforcement was lowered into the pile casing. The cage of reinforcement consisted of ten $\frac{3}{4}$-inch diameter bars with $\frac{3}{8}$-inch diameter stirrups at 9 inches centres. Concrete of $1:1\frac{1}{2}:3$ mix was then deposited in the casing up to the level of 3.50 feet above datum, after which the corrugated casing above this level was cut off. A typical cross-section of the lighter wharf is shown in Fig. 4.

The precast reinforced concrete transverse and longitudinal beams were then placed in position and the projecting reinforcing bars were concreted into the pile caps. The columns and column caps were also cast in-situ, and on top of these the precast deck beams and slabs were laid, the latter being jointed with cement mortar. The deck slabs were 3 feet 7 inches wide and 16 inches thick, and after laying the top surface was roughened and the whole slab was covered with a cement mortar screed $1\frac{1}{2}$ inches thick. Vertical and horizontal timber fendering was provided along the face of the wharf.

Before the construction of the lighter wharf commenced a steel sheet pile retaining wall was constructed to withhold the filling. Larssen No. 5 piles were used for this and a similar pile was used for walings to the tie-rods, which were $1\frac{1}{2}$ inch diameter mild steel rods at 5 feet 6 inches centres, the back end of the rods being fixed to a continuous mass concrete anchor wall 3 feet 6 inches wide and 8-ft. high. Rubble filling was placed behind the sheet piling to relieve the pressure from the fill.

Main Wharf.

The main wharf, which is 448 feet long and 50 feet wide, with a depth of water alongside of 20 feet below L.W.O.S.T., is of similar construction to that for the lighter wharf. In this case, there are five rows of screwcrete piles at 10 feet 9 inches centres transversely and 20 feet centres longitudinally, and cross and longitudinal beams, columns and deck slabs are provided similar



New Wharf at Port of Tiko—continued

to those in the lighter wharf. A typical cross-section of the main wharf is shown in Fig. 5.

In addition to the main timber fendering at piles, special resilient fenders have been provided on the main wharf to take the blow from a ship at berthing alongside. A further duty of these fenders is that, after the ship has been moored to the wharf, it has to be kept 3 feet away from the wharf face to allow of the loading of bananas through doors in the side of the ship in addition to those loaded through the main hatches.

The photograph (Fig. 6) gives a general impression of the main wharf nearing completion. The five counterweights for the resilient fenders can be seen on the deck before being lowered into position. The three furthest counter-weights have been completed and the lifting frame is in position of one of them. The two nearest counter-weights still have the shutters round the upper part. Adjacent to the nearest counter-weight can be seen the precast removable concrete slabs to be placed in the deck after the counter-weight has been lowered into position.

Fig. 6.

Fig. 7.

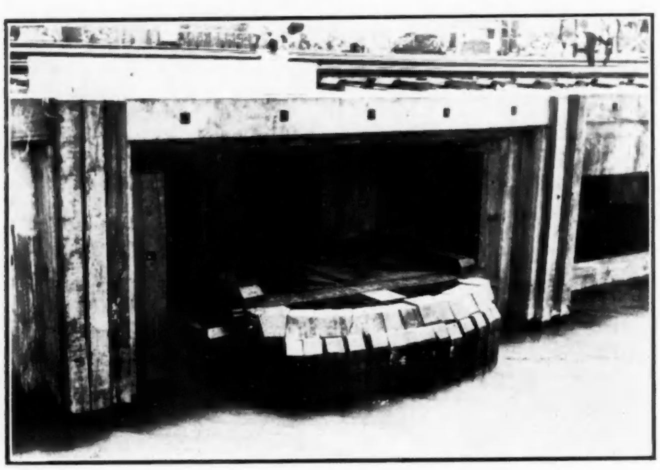


Fig. 8.

In the foreground can be seen one of the 8-ton capstans, and to the right of it a fairlead. One of the tank pontoons, before final assembly, may also be seen on the wharf edge.

The floating Scottish derrick seen in the photograph was used by the Contractors for lowering the precast members of the superstructure into position.

To the left may be seen the old wharf, and in the background one of the 3-ton fixed cranes on the lighter wharf.

The photograph (Fig. 7) shows the resilient fenders in position, some of the vertical timber fendering to the piles fixed, and the horizontal fender at cope level fixed but without the rubbing strip. The photograph (Fig. 8) shows a close up of one of the resilient fenders in position, from which can be seen the tank pontoon and the fendering to it, and the two concrete columns on either side of the gap.

A cross-section of the main wharf through a bay containing a resilient fender is shown in Fig. 9. These fenders consist of a tee-shaped pontoon made of Braithwaite tank plates with two connecting arms to a reinforced concrete counter-weight suspended on a trunnion bearing from the two adjacent piles. As the ship comes alongside the wharf, the pontoons are forced inwards, thus raising the counter-weight, which absorbs the kinetic energy from the ship. The counter-weight weighs 24.8 tons in air and the connecting arms, which are 30 feet long, consist of mild steel grade 15 tubes of 9 inches internal diameter, and 9/32 inch thick walls. The front and sides of the pontoons are provided with timber fendering, as are the insides of the two piles in the front row, to allow for rubbing when the ship strikes the fenders at an angle. By taking the weight off the outer end of the connecting arms, the pontoon can be disconnected and floated out for scraping and painting, and for this purpose a spare pontoon has been supplied. The resilient fenders were designed by Messrs. Braithwaite & Co. Engineers Ltd.

The screwing of the screwcrete piles, the in-situ concrete work, the placing of the precast concrete beams, deck slabs, etc., and the casting and fixing of the floating fenders was carried out by Messrs. Braithwaite & Co. Engineers Ltd. The driving of the steel sheet piling behind the lighter wharf, the fixing of the tie-rods and the placing and levelling of the filling was undertaken by Messrs. Costain (West Africa) Ltd., who were also responsible for the manufacture of the precast units for the superstructure of the two wharves. The lighter wharf was put into commission in April, 1954, and work on the main wharf, which commenced on 1st April, 1954, was completed on 31st August, 1954, a total of five months' work for the main wharf. The erection of the lamp standards, and the laying of the rail tracks were undertaken by the Corporation's own engineering department.

Errata. In section B-B (Fig. 5) the minimum penetration 15-ft. below Sea level, should read 15-ft. below Bed level.

Australian Waterfront Committee of Inquiry.

Members of the committee of inquiry into conditions on the Australian waterfront have been announced by the Commonwealth Minister of Labour. These have been appointed under the amended Stevedoring Industry Act which recently became law.

The first public sitting of the Committee was in Melbourne last month. Its terms of reference comprise the general functioning of the stevedoring industry and factors affecting its efficiency, arrangements for the regulation of operations of those employed in the industry, settlement of disputes and maintenance of discipline; costs and the extent to which they have affected freight rates since the Stevedoring Industry Act of 1947; profits of companies and others, including shipping companies; causes of all increases in freight rates; particular matters directed to the Committee by the Minister.

An Assessment of British Waterways

In their heyday the canals of England and Wales opened up the country to trade. Where do they stand today ?

By A. W. KNIGHT

TO canal enthusiasts up and down the country, a new Canal Age was ushered in by the Transport Act of 1947. For them it was the millennium and they envisaged the canals as once again assuming a dominant role in the country's transport system. It would be idle to pretend that they have not been grievously disappointed. They now look hopefully to the special Board of Survey, which was appointed earlier this year to examine the use being made of the British Transport Commission's inland waterways.

Public interest in our inland waterways in the last decade, which has seen the first attempt to create a waterways transport system, contrasts sharply with the apathy displayed during the long years in which canals declined, and in many cases, decayed.

This interest has shown itself in a stream of newspaper and magazine articles, in books, films, sound and vision broadcasts and in speeches and lectures throughout the country. Questions have been asked in Parliament. From all this publicity, welcome to an industry which for too long has been too little known, have emerged proposals which range between the extremes of pessimism and optimism.

"Fill them in, the canals are finished," cry the pessimists.

"Bigger and better canals" is the cry at the other end of the scale, and the advocates of this policy point to the enviably vast river navigations of Europe and America.

What, in fact, is the present position of our inland waterways? How do they face up to the future? Have they, indeed, a future at all?

The question would have seemed fatuous to the great canal men who gave Britain's Industrial Revolution its greatest impetus. When, in 1761, the Duke of Bridgewater, with James Brindley as his engineer, startled the engineering world by building a canal from his coal mines at Worsley, Lancashire, to Manchester, only a few miles away (the price of coal in Manchester fell at once by half), the future of canal transport was glittering indeed.

In the "Klondike" rush of canal building which followed developed the navigations and canals which we know to-day. As they grew so did the industrial areas of the Midlands and the North. The way to the sea—and the ports of the world—was now open, and industry boomed. The standard of life rose sharply.

Inevitably not all the canal schemes were far-sighted. Some, like Brindley's Grand Trunk, linking the growing Midlands with the seas of the Humber, Mersey and Severn estuaries, bore the stamp of genius. Others were inspired by only local considerations. And in all the building there was a rivalry between the various companies to which we owe a major problem of the industry to-day—the lack of a standard gauge. The canal era experienced no "battle of the gauge," and the through carriage of goods by inland waterway is still governed by the width of the narrowest lock on the route. This may vary from the 7-ft. locks of a narrow canal to the 42-ft. of a broad waterway like the Weaver Navigation. On the four main routes between the Midlands and the major estuaries, there are, in fact, no less than eleven different gauges.

But we have inherited also from the canal era some magnificent engineering works carried out by the great engineers for which the period was remarkable. These men who were found to fit the hour—names like Brindley, Telford, Rennie, Jessop, Watt, come readily to mind—were real pioneers, tackling problems never before experienced. They took their canals over rivers, across valleys, uphill, and if they couldn't go uphill they went through the hill. And to-day, as evidence of their skill and genius, we have, for instance, the fine aqueducts of Chirk and Pontcysyllte, tunnels like the Harecastle, the Standedge and the Netherton, and great staircases of locks such as the Bingley Rise, on the Leeds and Liverpool Canal. We have, too, a quite unmistakable style of architecture—many a whitewashed humped bridge looks to-day exactly as it did 150 years ago.

For 70 years the Canal Age enjoyed its boom unchallenged, until on a railway line from Stockton to Darlington was signalled the age of a newer, faster means of transport. The canals had to cope with progress.

Many quickly succumbed. Some sold out in panic, some sold out deliberately to share in the railway profits, some were bought out, others just declined and rotted away. But many competed vigorously, so much so, in fact, that it was not until the early part of this century, when the road haulage industry found its wheels, that they were made seriously to feel the general waterways decline.

There is no question that the railway companies, in general, seriously neglected the considerable mileage of canals which came into their ownership. But the railway owners were in business to make their undertakings pay and they can hardly be blamed for acting as does any manufacturer with two business lines of which one has a much greater selling power than the other.

Railway development had another serious effect on many waterways in that there was a shifting of industry to the new lines of communication. The industries went, but the canals remained, and they are still there to-day, tranquil memorials of past activity.

To these canals deserted by commerce we must add others whose original purpose has long since been served, like the cuts which run past worked-out mines and quarries. They've lived longer than their jobs.

The State Takes Over.

By 1948, the year the Act came into force, considerable lengths of waterway were no longer in use, the standards of maintenance were deplorably low and the total volume of traffic—40 million tons in the early part of the century—had fallen to little more than 10 million tons.

Under the Act about 50 waterway undertakings were transferred to the British Transport Commission, by which they were placed under the management of the Docks and Inland Waterways Executive (now, since October, 1953, a Board of Management). Many of these undertakings had previously been railway-owned (some already out of business), seventeen of them comprised separate and independently owned canals.

A few waterway undertakings, notably the Thames Conservancy and Manchester Ship Canal, were not transferred and still retain a separate existence. Altogether rather more than 2,000 miles of inland waterways came into public ownership and to the task of administering this collection of widely differing canals and navigations, the Act added a general brief to make them pay.

But however formidable the job, the long-advocated unification had been achieved and canal enthusiasts everywhere looked to the future with new hope.

The first task was obviously one of stocktaking and survey and an early step was to give the waterways in England and Wales a divisional organisation, four divisions being based on the estuary and port systems of, respectively, the Mersey, Humber, Thames and Severn. This relationship between waterways and ports was given further emphasis in a statement that transport by inland waterway is specially suitable and efficient for:—

Traffic imported and for shipment at ports connected with the inland waterway system, particularly in those instances where

An Assessment of British Waterways—continued

overside delivery from ship to barge, or vice versa, takes place. Other eminently suitable traffics are:—

Traffic which can be carried from point to point in barge loads.
Traffic conveyed to or from waterside premises.
Petroleum and liquids in bulk.
Traffic requiring bulk movement and storage in the warehouses of the canal authority.
Trunk haul to river or canal waterheads with subsequent delivery by road haulage.

The system had now a divisional organisation, traffic suitabilities had been decided. It remained only to get the traffic. And in this connection, an important fact which is certainly not generally realised is that the status of the canal carrying industry was not altered by the 1947 Act. Unlike the canals on which it operates, it did not pass into public ownership.

A small British Waterways fleet, comprising about 400 narrow boats, about 100 barges and 650 coal carrying compartment boats, did, however, pass to the Board, mainly because some of the canal companies taken over had themselves engaged in canal carrying. But canal carrying is not the primary function of the canal authority and the British Waterways fleet represents only about one-fifth of the total craft operating on our waterways. The remainder continues in the hands of private traders.

The coal-carrying compartment boat system in operation in the North-East.

It follows that the success of the canal industry can only come with the full support of the carriers. Obviously these traders, if they are to increase their fleets and to attract a greater volume of traffic, must be satisfied with the toll charges structure, with the terminal and other facilities and with the maintenance standards. But on the willingness and ability of the carriers to extend their private enterprise businesses the future of inland waterways must largely depend.

A common complaint of boatmen in the early days of British Waterways was that the bottom of the canal was much too near the top. It was often justified. The Board accordingly embarked upon a big dredging programme, particularly in the Midlands, where no dredging had been done for many years. An extensive programme of bank protection, necessitated not only by past neglect but by the greatly increased erosion caused by the powered craft which have almost wholly replaced the towage horse, was also begun.

Possibly as a result of these measures, the falling off of canal-borne traffic has been arrested, and the Commission's figures for 1953 show that 12,747,000 tons of traffic were carried by inland waterway. Of this total over half, 6,930,000 tons, comprised coal, coke, etc., and liquids in bulk—oil is a major and increasing traffic—accounted for 1,920,000 tons of the remainder.

The following figures show the traffic carried on the Commission's inland waterways in 1947, the last year of private ownership, and in subsequent years:—

Year	Coal, Coke etc. Tons	Liquids in Bulk Tons	Other Commodities Tons	Total Tons
1947				10,373,400
1948	5,515,000	1,756,000	3,960,000	11,231,000
1949	5,566,000	1,745,000	4,014,000	11,325,000
1950	5,791,000	1,836,000	4,175,000	11,802,000
1951	5,844,000	2,036,000	4,356,000	12,236,000
1952	6,322,000	2,021,000	4,099,000	12,442,000
1953	6,930,000	1,920,000	3,897,000	12,747,000

They do show a small improvement, but measured against the millions of pounds which have been spent on special and normal maintenance — nearly £1½ million a year — they are most disappointing.

They are trifling when compared with the tonnages which were canal-borne in other days, as the following tonnage-conveyed figures show:—

1868	25,000,000 tons
1888	37,000,000 tons
1898	41,000,000 tons
1905	39,000,000 tons

These figures are taken from official sources, and although they are calculated on a different basis from that used to-day, and thus should be treated with some reserve, it is possible that they underestimate the position rather than exaggerate it, since statisticians had not in those days yet come into their own.

Clearly, if canal transport is to be economic, the industry must capture more traffic—a great deal more traffic.

Equally clearly, a greater volume of traffic can flow by inland waterway only at the expense, to some extent, at least, of road traffic and the Commission's rail traffic.

If it is the Commission's policy fully to develop trade on its commercial waterways, in the belief that canal transport can exist prosperously alongside the other transport services, then an unequivocable statement of that policy would give the canal carrying industry the "go ahead" signal which it needs. It would certainly provide the best possible basis for a traffic campaign.

Carrying Canal Traffic in "Trains."

One important key to a much greater use of our waterways might be found in the type of service given by the British Waterways fleet of compartment boats. These compartment boats are used on the broad Aire and Calder Navigation, where they operate a remarkable system, certainly unique in this country, of coal-carrying "trains" from the Yorkshire collieries to the Humber port of Goole*. The compartments are simply steel boxes each designed to carry about 40 tons of coal. With a powerful tug at their head, nineteen of these compartments can be coupled together by chains to form a train which can thus convey about 700 tons of coal on a single trip. A crew of only four men is carried. The boats are slightly rounded to assist navigation round bends and are kept in line by a round stem piece on each boat which fits into a recess in the stem of the boat next ahead. A special headpiece like the bows of a ship, designed to act as a cutwater, is carried between the tug and the leading compartment. At the port the compartments are lifted bodily by special hydraulic hoists and their contents tipped direct into seagoing ships.

This system was evolved specially for the Aire and Calder Navigation's coal trade but its economic advantages are such that it might well be considered for use on other waterways. It would be better suited to the broad canals and navigations on which bulk traffic, such as coal to the big electricity power stations, is passing regularly or could be developed, and the size and incidence of locks would have to be considered, but the need to lock through a train of boats in two or even more operations would not necessarily be a deterrent.

On the narrow canals, and particularly on sections where locks are numerous, the system might not be found so suitable, but a modification could be employed in areas where a large number of non-motored craft—known as dumb boats—is regularly in use.

A development of the mechanical horse, a towage tractor which

* A full description of this method of canal transportation was given in an article in the April, 1954, issue of "The Dock and Harbour Authority."

An Assessment of British Waterways—continued

has been tried out on the towpaths of canals in London and elsewhere, might also be useful in train services of dumb craft.

Much potential traffic is probably lost to the canals because it originates only in small quantities. Traffic officers are naturally preoccupied by the desirability of boat loads but it may be a mistake to neglect the man with only five tons of traffic to send. Those five tons may bring him an order for fifty tons. A regular service between the chief waterheads could be maintained for these small traders, and extensively advertised. It would, of course, involve financial risk and it might indeed completely fail. But it might achieve success. In any case it would prevent the loss of goodwill which must occur when a trader is told that his traffic does not add up to an economic boat load.

One new and encouraging development is a waterways research organisation, and experimental work is being carried out on such subjects as:

The design and improvement of works associated with flowing waters in rivers and in canals.
The prevention of scour and silting in lock approaches in estuaries and rivers.
The elimination of cross currents.
Improved methods of lock operation and the design of sluices and sluice passages.
Faster lock filling without undue turbulence.
Automatic sluices.
The effect of wash on canal banks from different types of craft.
Improved designs of craft.
Elimination of pollution.

This research organisation may well be able, too, to assist in such problems as the serious subsidence caused by coal mining. This has long been a major problem in the Black Country, where the coal workings are often directly beneath the canal. Subsidence in this area has been as much as 30-ft.

There are, in fact, a number of operating difficulties peculiar to canals. One is the supply of water to the artificial waterways, many of which cross high ground between river valleys at a height of several hundred feet above sea level. The Grand Union Canal, for instance, on its way from London to the Midlands, climbs fifty-five locks to reach a height of 400-ft. above sea level at its summit at Tring in Hertfordshire, where a number of reservoirs have the job of replacing water which rushes away at a rate of 56,000 gallons every time a lock is opened. The engineers have the job of keeping up the supply in the reservoirs.

If any canal traffic "come-back" *is* envisaged, however, the Commission has made it fairly clear that it would be enjoyed by only a part of the system.

The present financial position of our waterways is bedevilled by the many miles of canal which, in the view of the Commission, long ago ceased to serve any real purpose. In fact, 800 miles of the system, comprising about 40 per cent. of the whole, account for only two per cent of the traffic carried.

These 800 miles of apparently uneconomic waterway are obviously an embarrassment to a Commission with a Government-imposed duty of making its undertakings pay, and it has not sought to conceal its opinion that, commercially at least, they should be written off. It has also made known the waterways which it considers do offer scope for further commercial development. These are:—

Aire and Calder Navigation
Sheffield and South Yorkshire Navigation
River Trent
River Weaver
River Severn
Gloucester and Berkeley Ship Canal
River Lee (Bow Locks to Enfield)
Grand Union Canal (London to Berkhamsted).

This list reveals once again an emphasis on those waterways which make connections with the ports.

A number of other waterways are recommended for "probable" retention on account of the traffic which originates on them, or because they form part of through routes. These are:—

Calder and Hebble
Leeds and Liverpool Canal

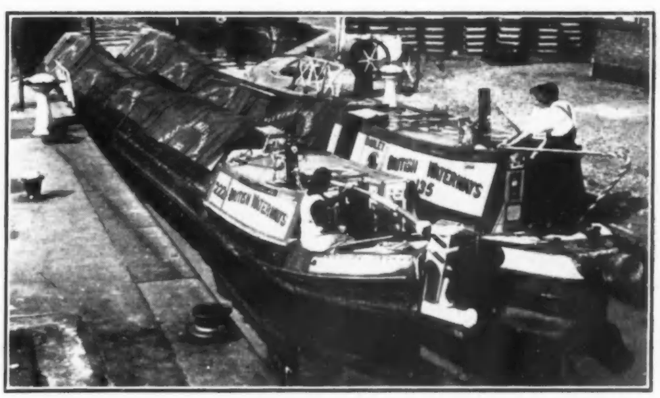
Petrol Barge on the Gloucester Ship Canal—South Western Division.

Shropshire Union Canal (main line)
Trent and Mersey Canal
Birmingham Canals and certain connecting waterways
Coventry Canal
Grand Union Canal (above Berkhamsted)
Oxford Canal (Northern Section).

From these pointers and from the pattern of new works which the Board has carried out—a notable example is the Town Lock at Newark, which was wholly reconstructed to allow of four standard Trent barges being locked through in one operation, thus removing a serious main line bottleneck on the route from the Humber—it seems clear that the Commission envisages a much smaller system of inland waterways, a system of main lines to and from the Midlands and the four major estuaries.

This is a prospect which, however realistically conceived, pleases the enthusiast not at all. It falls lamentably short of the 100-ton standard for the entire system recommended by a 1906 Royal Commission and for which he hopes even to-day. He argues that the development, or reconstruction, if necessary, of *all* canals to a *minimum* 100-ton standard, would be followed by such a resurgence of traffic as would more than justify the admittedly immense expense.

Such a vast project would have to have, as an essential prerequisite, a national acceptance of a complete re-assessment of our inland transport services. If waterways were to be so constructed that they could, in the areas they serve, carry efficiently the bulk of the nation's freight traffic, and there would be little point in embarking on a less ambitious scheme, the railway systems in those areas would be relegated mainly to passenger-carrying, for which they would have still to maintain the tracks and equipment at present used also for freight. This position would have to be accepted. The need for a further shifting of industry would also require acceptance, since again there would be little point other-



A pair of British Waterways family boats at the Brentford Depot near London.

An Assesssment of British Waterways—continued

wise in restoring and enlarging canals which at present wind only to worked out coal mines, or quarries. In the many important industrial or port areas which are not served at all by inland waterways the choice would be to cut new Continental type canals or allow these centres to continue, although rail and road-served, without connection with the country's main freight transport system.

One result would be a surfeit of transport in a country which already has more than it needs; another would be a quite uneconomic railway system—virtually for passenger-carrying only. You must, in fact, rob Peter to pay something to Paul. Indeed, in order to give canals a dominant role, you would need to rob Peter of far more than Paul could cope with—for the enthusiast sometimes forgets that modern industry now provides our rail and road systems with a total yearly freight traffic of 1,200,000,000 tons.

In any case, the expectation that greatly increased traffic will automatically follow the creation, or restoration, of broad, deep waterways has not been realised on some of the country's already broad waterways, capable of accommodating craft of up to 400 tons. There, as elsewhere, the carriers wait, perhaps, for the simple statement that the waterways have a definite place and future in the national transport system.

A rather different case can be made out for the canal lovers who have come to know and enjoy the loveliness of some of our canals. There is a glamour about the cuts—many of them have rich historical associations—and the number of their devotees increases each year. This fascination of the canal scene is naturally greater in rural, non-industrial areas where the canals have merged perfectly with their surroundings—for canals grow old very gracefully. Much of their beauty is owed to the very lack of commercial development for which their admirers, seeking to preserve the canals, now cry out. These enthusiasts are really concerned only to preserve what they have come to regard as a national heritage.

It is impossible not to feel some sympathy with this conception. Some of the waterways are indeed lovely, and especially so where commerce has left them to mellow. But the conception is not one of transport and the theme of transport must inevitably colour the views of the Commission, or indeed of any canal authority which is set up with the same brief.

A substantial mileage of waterways remains open to navigation, and on these waterways a policy of high maintenance standards, modern cargo handling and increased fleets of powered craft should reinforce a traffic campaign for many more million tons of traffic each year. In this campaign the independent canal carriers (it is worth repeating that these traders are greatly in the majority) would play an important part and not the least of their efforts and those of the canal authority should be to enrol a sufficient labour force, for there is a present worsening shortage of boatmen. The canal industry has many features quite peculiar to itself and the workers on its boats and barges provide a notable example. This is specially so on the narrow canals, on which the family canal folk work their narrow boats, living lives quite remote from those of the rest of the community.

The People of the Canals.

By tradition, the family boatman is a taciturn, gruff (even gruffer if called a bargee) weatherbeaten Romany with an unrivalled command of boat and language. This Romany tradition is picturesque, like the roses and castles still painted on the boats, but it is now generally accepted that the forerunners of these boatmen were the "navigators" who laboured on the first digging of the cuts, giving us the word "navvy" in the process. Whatever his origin, however, the family boatman is a hardy chap with a great pride in his boat and job and it is almost certain that, like his father and grandfather before him, he has spent the whole of his life on the canals of England and Wales. This tradition of the son following his father, a tradition which has guaranteed the continued supply of the best possible kind of labour, for the boys learn to operate a lock and handle a boat as naturally as they learn to walk, has only latterly begun to weaken. The development of the welfare state, and the demands of national service during and since the war, have given the young men of the narrow boats experience, either in the Forces or in factories, of another way of life. Inevitably some have preferred it to the nomadic life of a canal boatman.

The narrow canals represent only a part of the waterways system, however, and their boat folk are inherently different from the boatmen of the broad canals and navigations which can accommodate barges and sea-going vessels of up to 400 tons. On these craft the family system has no place. The boatmen have shore-based homes like the rest of us and although, during trips, they may spend some nights aboard their craft, the hauls are generally shorter than on the narrow canals and the men are able, in the main, to live normal family lives. Even so, the life of a boatman, governed as it is by perhaps sudden traffic calls, does not offer the same working conditions and regularity of hours which prevail in many shore industries.

But when the canal carrying industry regains its confidence in its own future, and that will be as soon as it is told, categorically, that it has a future, then boatmen will surely be found for all existing craft and for all the new craft which will then be built.

The need energetically to canvass traffic will increase as the waterways fleets come up to proper strength. Waterside industries which have lost the habit of consigning traffic by water must be re-attracted by the promise of service, and wholeheartedly converted by performance.

The publicity which has been given to the near-derelict canals has unfortunately tended to give us a quite false impression of the whole system. Canals are not generally known and a mention of them will often provoke a chuckle even in otherwise well-informed transport circles. A visit to some of the waterway terminals and other depots throughout the country would quickly dispel a wrong impression. Modern gantry and mobile cranes, easy berthage alongside large fully equipped warehouses, ample storage areas and a busy movement of boats contribute to a canal scene quite at variance with the common conception of canal transport as slow, almost indolent. This idea of slowness is largely fallacious. Canal boats do not, of course, have the speed of locomotive or lorry, but the locks are their only traffic blocks and they are unhindered by any need for shunting operations. In the overall result, the actual time of transport, particularly when both despatch and destination points are canal-connected, is often not unfavourable.

The picture is not yet one of obsolescence.

To the clamour made by the out and out "canals for canals' sake" enthusiasts is sometimes added the suggestion that the control of our waterways should be removed from the Commission and placed in the hands of a separate authority concerned *only* with inland waterways.

It can, indeed, be argued very convincingly that the Commission, which has as its main care (emphasised by the 1953 Transport Act) a railway system which carries each year a freight traffic approaching 300,000,000 tons and which, on the face of it, could absorb the 12,000,000 tons carried by inland waterway without much noticeable difference, must inevitably be too railway-minded to study seriously the needs of a lesser, competing form of transport. It is difficult, nevertheless, to see in what way the policy of *any* canal authority could be drastically different if it were given the same duty of paying its way as is the Commission.

When the canal era began the pack horse was ousted (nobody clamours to-day for its return) and when the railways came they gave the canals what was nearly a knock-out blow. In their turn the railways were made to suffer by the development of the petrol engine. And to-day, air freight services are increasing rapidly and may well in the quite near future offer serious competition. What of our waterways?

I do not expect ever to see British waterways patterned on the great Continental or American systems. Proposals that they should be so patterned ignore our geography, our industrial and transport development and our lack of the vastly long, deep, wide rivers, navigable far from the sea, which alone make such systems economically possible. Given a clear mandate, vigorous management and an enthusiastic carrying industry, however, our waterways can play an increasing, indeed significant, role in the country's transport industry. But they must have that mandate.

Perhaps the Board of Survey will give it.

Ancillary Craft for Harbour Work

Many Types for a Variety of Services

By A. G. THOMPSON

Port Authorities and many official and commercial organisations need ancillary craft for a variety of purposes to carry out their day to day commitments. The size, draught, speed and equipment of these craft varies considerably with the duties on which they are employed. Careful consideration therefore has to be given to their construction according to the conditions under which they will be called upon to work. Some must be seaworthy for duties in port and harbour approaches, and must be stout enough to stand the buffeting of high winds and seas. Some, on the other hand, must be small and light draughted, to enable them to operate in shallow water and the upper reaches of rivers, or in the restricted channel of a canal. Those that are for service in the tropics need more ventilation for the engine room and cabins. Some of the larger vessels are equipped for salvage and for firefighting or can be used as tenders. Many are equipped with towing gear for use in emergency.

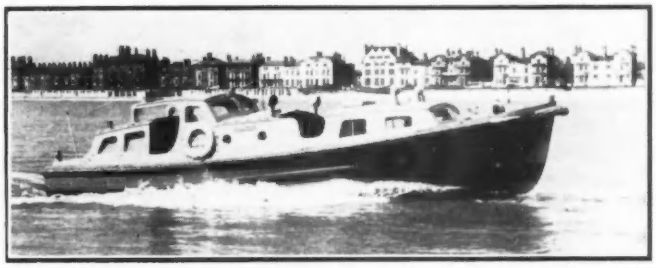
Service launches are required by Port Authorities for their Harbourmasters, Dockmasters, Hydrographic Surveyors and other officials whose duties take them afloat. H. M. Customs and Excise, Port Medical Officers, Pilots, and Marine Police also need launches to carry out their duties. Armed services based on ports or rivers have their own launches of varying types, and most shipowners, ship repairers, stevedores, and other ships' contractors find the ownership of launches essential.

While it is not possible to give a description of all the many types of craft which have been built in recent years particulars are given of some of those more recently commissioned, including some built of aluminium alloy.

The maintenance of port facilities and approaches to the Birkenhead and Liverpool Docks, necessitates the Mersey Docks and Harbour Board operating a fleet of no less than 57 specialised craft. These include pilot, salvage, and survey vessels etc. The most recent addition to the pilot boat fleet is the *Edmund Gardner* which came into commission at the end of 1953. This vessel is 165-ft. long, with a breadth of 31-ft. 6-in. and a mean draught of 10-ft. 4-in. The vessel has accommodation for 32 pilots and a crew of 5 officers and 18 hands. The pilots' cabins are on the lower deck and on the main deck is their dining saloon and lounge.

The *T.S.S. Vigilant* built by Messrs. John I. Thornycroft and Co. Ltd. at their Southampton yard, was designed specifically for service in Liverpool Bay. The initial designs and specifications were prepared by Messrs. Graham and Woolnough, the Liverpool consultants, in close collaboration with Captain W. R. Colbeck, R.N.R., the Marine Surveyor, and Water Bailiff of the Mersey Docks and Harbour Board, and his Assistant (Engineering) Mr. J. L. M. Main. The vessel was constructed to Lloyd's highest class for salvage purposes and is fitted with a special heavy bow casting capable of taking a load of 100 tons, and suitably arranged on the forward main deck are bollards, samson posts, eyeplates, and fairleads to cope with heavy salvage operations. There is also an anchorage lined up with the bow casting to take a 100 ton purchase. The vessel can also be used for buoyage operations. The *Vigilant* has a continuous main deck and a bridge deck extending from just forward of midships to aft, leaving a short working space at the stern. Forward of the bridge, on the main deck is the auxiliary machinery comprising a 20-ton steam winch, two 10-ton electric capstans, one port and one starboard, and one 5-ton warping and cable capstan on the port side working an anchor which is recessed into the starboard shell. A 4-ton warping capstan is fitted aft. The tubular foremast is equipped with two heavy tubular derricks. The fore derrick can take 5 and 10-ton lifts and the aft derrick, 5, 12 and 15-ton lifts.

The T.S.S. Vigilant built for the Mersey Docks and Harbour Board.



The diesel-engined Charger built for use by the Nigerian Customs Service.

Fire-fighting equipment comprises a salvage pump with a capacity of 440 tons of sea water per hour and two 6-in. Dixon monitors each having a capacity of 1,600 gallons per minute at a pressure of 230 lbs. per square inch at the base. A wide range of nozzles is provided to suit varying conditions. Fourteen portable rail guns are provided for operating either from the bulwarks or from the mast head. Various distribution boxes and hose connection valves are fitted throughout the ship. The hoses are of nylon lined with latex. Two mechanical foam generators are installed for dealing with fires where oil is involved. Each of them is capable of producing 900 gallons of foam per minute and is of sufficient capacity for operating continuously for two hours under normal conditions.

Navigating equipment includes radar, V.H.F. telephone and echo-sounding. Accommodation for ship's officers and engineers is in the aft end of the bridge house and comprises single berth cabins for the master, mate, chief engineer, second engineer, wreck master, and steward. The marine surveyor and his two assistants are berthed in single cabins at the fore end of the bridge deck. The ship's crew and firemen, fourteen in number, are accommodated in two-berth cabins situated on the lower deck.

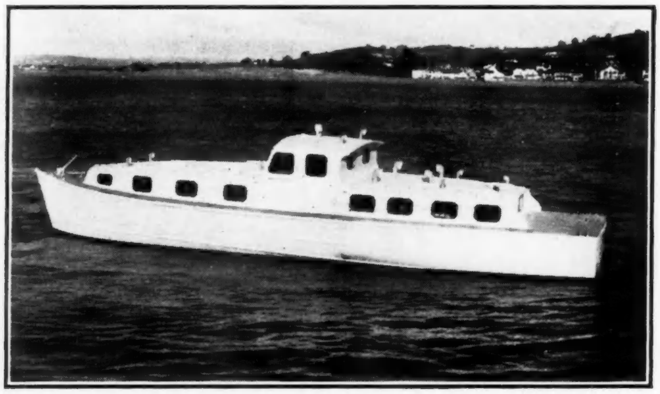
The *Vigilant* has an overall length of 172-ft. 6-in., breadth 35-ft. and a mean load draught of 11-ft. 1-in. and at full power of 1,450 I.H.P. has a speed of 12½ knots on load draught. The vessel is propelled by twin-screw triple expansion surface condensing open type reciprocating engines. Two diesel-driven generating sets, each having an output of 150 to 180 Kw. at a maximum voltage of about 350 D.C., supply power for the fire and salvage pump. These sets are connected to serve the capstans, air compressors, overside supply, and other services at voltages ranging from 110 to 220 D.C.

For service in Nigeria, Brooke Marine Ltd., a subsidiary of Dowsett Holdings Ltd. constructed at their Lowestoft yard two Customs launches, the *Charger* and the *Checker*, to the order of the Crown Agents for the Colonies on behalf of the Nigerian Government. The general construction followed that of a utility launch of robust scantlings. The keel, stern, aprons, knees, etc., were constructed of English oak. Planking is carvel laid African mahogany, and all fastenings are of copper, except at the stern, transom, etc. where brass screws are used. The bottoms are cop-

Ancillary Craft for Harbour Work—*continued*

per sheathed. Pine was used for the bulkheads and decking which is caulked and filled with white lead filler. In view of the occasional need for service launches such as these, English oak tow posts have been fitted aft. Crew accommodation is aft while the cabin forward is an extension of the foreward cockpit.

The *Charger* is powered by two Perkins P.6.M. marine diesel engines with 2/1 reduction gear and reverse, each developing 65 b.h.p. at 2,000 r.p.m., and has a service speed of 11½ knots. The *Checker* is fitted with one Perkins P.6.M. marine diesel engine with 2/1 reduction gear and reverse, and has a service speed of 9½



The 55-ft. light alloy patrol launch built for the Government of Burma.

knots. The dimensions of these launches are 36-ft. length overall, beam 9-ft. 6-in. and draft 2-ft. 9-in. The displacement of the *Charger* is 6.5 tons and that of the *Checker*, 6 tons.

It is claimed that the use of aluminium alloy gives a very high power weight ratio and that a full load has surprisingly little effect on the maximum speed obtainable.

A light alloy launch built for the Burmese Government by Messrs. Grimston Astor Ltd., of Bideford, is designed to accommodate 45 troops in a spacious cabin forward of the wheelhouse. This aluminium alloy launch of 55-ft. length is outstanding in that with a beam of 14-ft. 6-in. and tropical headroom of more than 6-ft. 6-in. throughout, the total displacement is approximately 6½ tons. That this is possible in spite of the launch being fitted with skegs to protect the propellers and allow the hull to ground on a hard or soft bottom without any legs or other complications, is even more significant. The launch has a cruising speed of 14 knots. The hull plating transom and floors are 10 gauge corrosion resistant light alloy to specification N.S.5. Deck plating is ⅛-in. light alloy positive grip (chequered) plate to British Standard Specification H.P.10.W.P. The keels and bilge keels are 3½-in. x 3½-in. x 5/16-in. by ⅜-in Tee section light alloy to specification N.E.5. The launch is engined with twin Perkins P.S.M. diesel engines, direct drive, each developing 65 b.h.p. at 2,000 r.p.m. On trials the launch proved to be extremely manœuvrable and easy to handle, completing 360° turns at full speed in approximately two lengths. From full speed ahead the vessel was stopped and made to go astern in a period timed at between 6 and 9 seconds. This is a useful advantage for fast launches operating in tropical waters where logs and other flotsam may suddenly appear. The lay-out of this launch is capable of easy alteration to a wide variety of other purposes. The large fore cabin can easily be sub-divided in a number of ways and the wheelhouse with its floor can be extended aft to make a large deck saloon over the motors.

Several other designs based on this hull have now been produced by the builders. Among them is a 16 knot yacht for use in the Mediterranean and for fast passages between London and Belgium. Other launches are being built for patrol service in Oriental rivers and estuaries.

Another aluminium launch built by Grimston Astor Ltd. on their "Two-way tension" technique was for the British India Steam Navigation Company's use for inspection purposes on the Pussar River, Pakistan. This launch made the journey from Bideford to London under her own power prior to being loaded aboard the *Karmala* in King George V Dock for shipment to Pakistan. The launch has six compartments including a fore cabin to seat 12 passengers, a closed cockpit amidships with seating for four, and an aft cabin for the crew. Power is given by two Perkins S.6.M. marine diesel engines, each rated at 100 b.h.p. at 2,000 r.p.m. and each is supplied with an oil-operated reverse gearbox. On her trials this launch was turned at full speed, port and starboard helm in a circle of 60-ft. She behaved very well in open water with a strong south-westerly wind and a short light sea. Her average speed was 20.79 knots. The overall length of this vessel is 40-ft., breadth 12-ft., service draught 2-ft. 9-in. and displacement 4½ tons.

An example of a much smaller type of high-speed launch is the one designed by Messrs. Frederick Parker and Partners Ltd., and built by Messrs. Woodnutts Ltd., of St. Helens, Isle of Wight, in collaboration with the British Aluminium Co. Ltd., for the use of Mr. David Brown of the David Brown Tractor Group. The principle of longitudinal framing has been used throughout, achieving great strength with minimum weight. All aluminium sheet material is in N.S.5 and all extruded sections are in N.E.6. Rivetted construction is used throughout. The launch is powered by a special Aston Martin D.B.3 engine and the purpose of constructing this vessel was for the development of this type of engine for marine application. In this instance over 160 b.h.p. is being obtained. Preliminary tests gave speeds of from 31 to 35½ knots and there were indications that a still higher speed might be anticipated. The engine cooling system is of interest in that cooling tanks are formed at the bottom of the launch, the system being a closed circuit. No reverse gear is fitted. The propeller is chromium plated bronze, and the shaft is stainless steel, the bracket being an aluminium bronze casting.

Thames Launch Works Ltd. have recently completed the tug *Zallaq* for use by the Caltex Oil Group, Bahrein Petroleum Co. Ltd.; in the Persian Gulf. The tug is an all-welded twin-screw steel vessel 60-ft. long, 15-ft. breadth, with a loaded draught of 1-ft. 10-in., and a displacement of 27 tons. The speed on trials was 9.4 knots. The hull form has been built up on the principle of a combination of conical and cylindrical surfaces and the shell plates laid in position without preforming, thus giving great advantage in simplicity and ease of construction, and in making repair easier for yards overseas where labour and facilities may not be

A high-speed launch built for the David Brown Group.

to the same standard as on the Thames. Owing to the limitations imposed on draught the vessel has propellers operating in tunnels, and fitted with Kort nozzles. The increase in pull afforded by the nozzles is especially valuable in shallow draught vessels where the propeller diameter is restricted by the small draught.

The nozzles of the *Zallaq* show an interesting departure in method of manufacture in that they are partially cast in steel. Hot climate ventilation is provided for by an opening skylight in the machinery casing top, two large cowl ventilators, and a grill in the middle of the after end of the wheel-house. Propulsion is by two 6/71

Ancillary Craft for Harbour Work—continued

The tug "Zallaq" undergoing her trials.

General Motors diesel engines set to develop 110 b.h.p. at 1,400 r.p.m. and driving the propellers through 2-1 reducing gears. The engines are operated from the wheel-house by remote control. A particular feature demonstrated on trials was the *Zallaq's* manœuvring ability. A full circle of about 60-ft. radius was completed in seventy seconds while with one engine ahead and the other astern, the vessel pivoted almost on its own axis.

The M.T. *Caedmon Cross* has recently been brought into service by the Tees Towing Co. Ltd. This tug, which was built by Messrs. Scott and Sons, Bowling, is engined with 750 b.h.p. Crossley C.G.L.4 two-stroke diesel engines controlled directly from the wheel-house by the master. An interesting feature of the control pedestal is the ability of the master to put the main engine on overload for limited periods and under special circumstances of towing. To do this the telegraph handle is depressed to its lowest point but can only be held in position against a spring. This safeguards the engine from being kept on overload for undue periods. Control and navigation can be carried out from the totally enclosed wheel-house or from an open platform above. The owners of the *Caedmon Cross* can claim to be pioneers in diesel engined tugs for their *Acklam Cross* which came into service in 1933 was the first motor tug built for ship handling in Europe. The *Caedmon Cross* which is 80-ft. in length has been built as short as possible for the work she does and to give her great manœuvrability. It is claimed that this tug has one of the smallest turning circles of any tug of equivalent power. The hours of duty of the *Caedmon Cross* being uncertain, provision has been made for the crew to sleep on board and accommodation has been provided in a neat block below the wheel-house and main deck. A galley-messroom has been provided and should prove to be a great advantage over the old convention of having a coal-fired galley at one end of the ship and the messroom remote from it.

Dock Labour Accidents

Survey of Recent Investigation at P.L.A.

The International Cargo Handling Co-ordination Association's latest symposium, held at the Institution of Mechanical Engineers, London, on October 28th last, dealt with "The Incidence of Accidents in Dock Working" and "The Multiplicity of Cargo Markings." The following excerpts are taken from a paper on the former subject, presented by W. T. Shaw, M.A., LL.B., of the British Medical Research Council.

At the close of 1952 the author sought permission to undertake an analysis of accidents occurring in the port transport industry in London. The response of some concerns approached was not encouraging. The Port of London, however, and the National Dock Labour Board agreed to co-operate in the work, and offered full facilities. A survey of the Dock Labour Board's records revealed that these contained insufficient data for the analysis contemplated, and it was decided therefore to base the investigation on the Port of London Authority's records supplemented where necessary by those of the Dock Labour Board. It must be pointed out that whilst the Authority undertake a considerable proportion of ship discharge, transit shed, quay and warehouse work, they do not undertake the loading of ocean vessels. The findings set out below, therefore, may not be altogether representative of port transport operations as a whole.

The records chosen for analysis were those relating to all accidents occurring to employees of the Authority during the year 1st April, 1952, to 31st March, 1953. During that time the Authority employed some two thousand permanent weekly labourers, and an approximately equal labour force, whose composition naturally changed from day to day, of allocated or daily workers.

Inspection of the Authority's records showed that a great deal of relevant information was available for every accident reported. Before this could be used in a statistical analysis, however, it would be necessary to list and code the various types of equipment used in port transport operations, and also those operations themselves. With the assistance of experienced Traffic Officers and after some weeks of observation at the docks, a code was finally worked out which was felt to be exhaustive as far as the work of allocated and permanent labourers was concerned. Supplementary codes for the cargo handled and the nature of the object actually inflicting the injury in the accident were also worked out.

Collection of Information.

The main source of information was the Authority's standard accident report form. These reports are filed under serial numbers at the head office and it proved a comparatively simple matter, for the year under study, to extract those for all accidents to the Authority's employees throughout the Port. With the form was filed any relevant correspondence, reports of witnesses, first-aid men, ambulance room attendants and, in the case of accidents to Permanent employees involving over three day's absence, the report of an examination by the Authority's Medical Officer. From the information thus available a code slip was completed for every accident case.

When the code slip was completed, the information was transposed to Hollerith punch cards. In practice, it was found that only few accidents were in fact difficult to code. The great majority fitted easily into one or other of the simple categories. Where items were found to be missing from the accident report file, the information was sought from other records. The length of absence for all allocated labourers in cases over three days was obtained from London Dock Labour Board records. In the treatment of results, use is not made of the average length of absence as a measure of severity rate.

Listing the cards punched from the coded reports gave for the year under review a total of 905 reported accidents for Permanent labourers, 1,004 for Allocated labourers, and 896 for other grades in the employ of the Authority.

No adequate departmental figures were obtained for the hours worked aboard ship, in craft, or ashore; but from the point of view of accident prevention the figures show that by far the larger proportion of reported accidents happen within the warehouse, shed or vault.

Artificial Lighting and Dock Accidents.

The hourly rate of accidents may also be used as a measure of the adequacy of artificial lighting. This matter was the subject of a lengthy enquiry by a Departmental Committee of the Home Office between 1915 and 1922. It was assumed that artificial lighting was in force from half an hour before sunset till half an

Dock Labour Accidents—continued

hour after sunrise, and the accident rate during daylight and artificial light was computed from about 161,000 accidents on this assumption. The most affected were dock workers; a sharp seasonal variation was found for this category, coinciding closely with the variation in artificial lighting.

The position to-day so far as it relates to the Authority's employees and the Port of London was found by comparing accidents per hour for the months of May, June, July and August with those for the months of November, December, January and February. No increase whatever is apparent for the hours of artificial lighting in winter. These results compare favourably with those from the earlier investigation. If the figures are representative of the industry, they are a measure of the improvement from that earlier day to this.

Equipment Involved in the Accident.

In most industrial occupations that have been studied, the accident rate diminishes with increasing age and experience, new entrants in general being particularly responsible for high rates.

While coding other items an attempt was made to code the nature of the object actually inflicting the injury. One striking result is that for approximately a half of all accidents reported no equipment is coded as being involved. Another is that the handtruck is by far the biggest contributor numerically to the total of accidents. The handhook numerically contributes almost as many accidents to the total as all types of cranes combined. The crane (all types, save for the mobile crane) is seen as the most dangerous piece of equipment in use, as was expected.

An interesting fact to note is the absence of accidents reported for the fork-lift truck. It is possible that this equipment by eliminating the manual handling of cargo and with protective shields for the driver, considerably reduces the accident rate. Control figures for the amount of cargo shifted and the number of individuals at risk are not available without, however, a special study. The author believes that such a study would be possible, and, in view of the present high accident rate in trucking, recommends that it be undertaken.

Faster Working at N.Z. Ports

New Zealand Waterfront Commission Report

The annual report for the year ended March 31st, 1954, of the New Zealand Waterfront Industry Commission states that the satisfactory conditions on the waterfront brought about through the strike in 1951 have been maintained during the year. The rate of work shows a further increase compared with last year, and there has been a corresponding increase in the average rate of profit under the co-operative contracting system. There were no stoppages of work through industrial disputes, and the only lost time was through two unauthorised extensions of stop-work meetings at Auckland and one at Wellington to deal with urgent union business which resulted in a loss of 6,304 man-hours, as compared with approximately 13,000,000 man-hours worked.

Improved Turn-Round of Overseas Vessels.

There was a substantial improvement in the turn-round of overseas shipping. For the year ended 31st March, 1954, overseas refrigerated vessels discharging and loading at New Zealand ports spent 49-84 days on the coast, as compared with 68.25 days in 1952-53. This saving of 18.41 days per vessel is largely due to the elimination of delays awaiting berths and shortages of labour which occurred in 1952-53 through the serious congestion of shipping in the early part of that year. The cargo handled per ship working day also increased from an average of 362 tons in 1952-53 to 402 tons in 1953-54.

The total cargo handled at New Zealand ports for the year ended 31st March, 1954, was 9,346,000 tons, as compared with 9,977,000 tons in 1952-53 and 9,662,000 tons in 1951-52. The reduction in tonnage handled, which was mainly due to reduced imports from overseas, caused some periods of slackness of employment and contributed towards the substantial increase in cost of daily and weekly guaranteed wage payments from £114,811 for the year ended March, 1953, to £153,679 for the year ended March, 1954.

New Agreement Working Smoothly.

The agreement reached between employers and workers as to conditions of employment on the waterfront came into force on 31st August, 1953. Notwithstanding the many changes in conditions which had operated for many years, the new agreement has worked smoothly and with the good will and co-operation of both sides. Where agreement is reached between employers and workers as to conditions of employment, there is always a greater possibility of such agreement being carried out than where conditions are determined by arbitration. Credit is due to the National Joint Interpretation Committee for its work in interpreting the new order. This Committee which comprises four representatives each of employers and workers, has met regularly and given interpretation on matters referred to it from the ports, and has thus obviated these matters being referred to the Waterfront Industry Tribunal for decision.

Harmonious relations exist between employers and workers. Old and new watersiders in the various port unions are working side by side without friction. The friction which existed between members of the two unions at Wellington has now been largely overcome. By agreement with the employers, approximately 200 members of the casual union have been accepted for permanent employment and have joined the permanent union. The members of both unions are now engaged through the one bureau and occupy the same waiting room.

Supervision and Discipline.

The Commission in its annual report for the year ended 31st March, 1952, pointed out that the supervision and discipline of waterside workers was in the hands of the employers, and if the improved conditions on the waterfront were to be maintained it was imperative that the employers exercise adequate and continuing supervision, and in particular ensure that men work the full hours for which they are paid. There is a tendency at some ports for men to be allowed to start late and finish early.

Supervision is the direct responsibility of superintendent stevedores and foremen, whose efficiency and ability vary considerably. The Commission appreciates the difficulties that employers are faced in recruiting suitable and capable foremen. The continued efficiency of the industry is, however, so largely dependent on the foremen employed by shipping companies and stevedoring contractors that it has been suggested to the New Zealand Port Employers' Association that consideration should be given to the introduction of a training scheme for foremen.

Vocational training for dock workers and foremen has been undertaken at Rotterdam since 1949 and, it is understood, with very satisfactory results. In addition to training in stevedoring operations, foremen could receive instruction in the interpretation of Tribunal orders, the prevention of accidents, first aid, care of cargo, and human relations.

Proposed Revision of Contract Rates.

For some years the Commission has recommended that there should be a comprehensive revision of contract rates with the object of securing, as far as possible, an equal return to workers for equal effort and the inclusion in the revised rates of non-cargo-working time. This would provide an incentive to the workers to reduce delays; time taken in handling hatches, gear, etc., and also provide an incentive not to cease work unnecessarily during showery weather. A revision of contract rates along these lines will improve the efficiency of the industry and assist in maintaining peace and harmony on the waterfront. It is expected that employers and workers will shortly be entering into negotiations to give effect to these proposals.

Financial Position.

At the end of the financial year under review there is a net surplus in the National Administration Fund of £15,702 after transferring an amount of £25,000 to the Guaranteed Wage Reserve, an amount of £30,000 to a General Reserve, and after providing for the debit balance last year of £5,104. While the financial position of the National Administration Fund is much more satisfactory this year, the reserves available to the Commission to meet any substantial reduction in trade cannot be considered adequate.

Faster Working at N.Z. Ports—continued

For a number of years the levy has been fixed with a view to providing only sufficient funds to meet current expenditure and without budgeting for any surplus which could be placed to reserves.

The Revenue Account of the Fund for the previous four years shows the following position:

31st March, 1950	£9,932 loss	31st March, 1952	£2,606 profit
31st March, 1951	£10,510 loss	31st March, 1953	£635 profit

The expenditure from the Fund is largely governed by matters outside the Commission's jurisdiction. Increases in remuneration agreed to between employers and workers or prescribed by the Tribunal mean increased cost of annual and statutory holiday pay and daily minimum payments without any automatic corresponding increase in revenue which would be the position if levies were fixed as a percentage of wage payments as in England instead of on a flat man-hour rate as collected in New Zealand. The increase at main and secondary ports in weekly guarantee agreed to between employers and workers from £6 6s. 6d. per week to £8 per week and the reduction in overseas imports has resulted in a substantial increase in cost which, during the year under review, amounted to £153,679. The increase in the amount of the weekly guarantee also applied for only portion of the year, from 31st August, 1953.

Need For Adequate Reserves.

The Commission has a guaranteed wage reserve of £125,000, including the £25,000 transferred this year, available for meeting increased cost of guarantees during any period of trade recession. During any such period the expenditure from the Commission's National Administration Fund would increase through increased cost of guarantees and income would decrease through a reduction in hours worked on which levy is payable. Unless, therefore, adequate reserves are built up during periods of prosperity, it would be necessary during any periods of reduction of shipping to increase levies, and this would be done at a time when the industry could least afford the additional cost.

A lesson is to be learned from the experience of the National Dock Labour Board in England. Due to the reduction in the volume of work in 1952, the Board found it necessary as from 14th November, 1952, to increase its levy to 22½ per cent on gross wages, which was a heavy burden on shipping. Although the volume of trade improved, this rate of levy was maintained until 1st August, 1953, when it was reduced to 16½ per cent. on gross wages. This had the effect of greatly improving the finances of the Board, and for the year ended 2nd January, 1954, there was a surplus of £1,873,493 and the General Reserve Fund of the Board stood at £2,711,123, apart from welfare funds totalling over £700,000.

To provide a stable fund in New Zealand which could be used to cushion the effect of any trade recession, it will be necessary to budget for a surplus which will enable adequate reserves to be provided. This matter will be discussed with employers when the rate of levy is reviewed later this year.

Mattress Sinking at Sea

An Additional Protection for the Dutch Coast*

One of the less-known but essential weapons used by Holland in her everlasting battle with the water is the mattress, which forms a base for dikes and dams which have to be built up on the soft sub-soil of the sea bottom.

The mattress, as its name implies, is an oblong structure made from osiers. It may reach such dimensions as 230-ft. (70 m.) in length by 165-ft. (50 m.) wide. It frequently has to be towed a considerable distance in open sea from the place where it is made to the point where it is to be used, and this work may require several small tugs.

Line-up of mattress-sinking gang at commencement of the operation.

Mattress being towed in open sea.

Sinking nearing completion. Men preparing to leave mattress.

After being manoeuvred into the position where it is required, the mattress is secured by means of not less than 30 anchors, and the very tricky job of sinking it commences. This calls for the services of a foreman, with a thorough knowledge of the technique and a stentorian voice, and a great number of robust and highly-skilled men. From 12 to 14 large barges carrying many tons of boulders are manually unloaded on to the mattress and it will be readily understood that the whole success of the operation depends upon the ability of the foreman and his gang so to place the load that the mattress will not heel and throw it off. It will also be obvious that there is some risk attendant upon this work, in that at the latest possible moment the men must leave the mattress and complete the sinking by transferring particularly heavy boulders to it from the barges. On the successful conclusion of the operation a foundation has been laid for another line of defence for the coast of the Netherlands.

* Reproduced from the News Bulletin of I.H.C., Holland.

Through Freight by Road, Rail and Sea

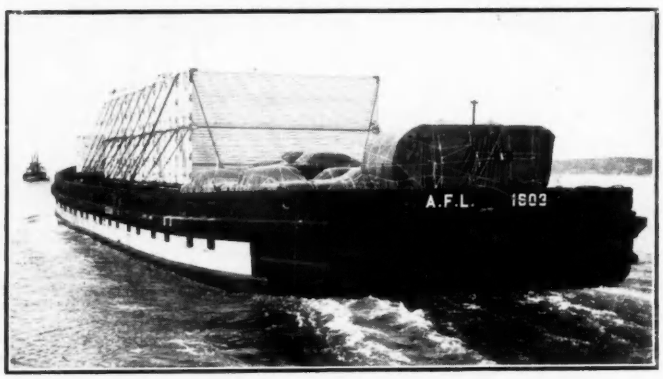
The Carriage of Containers, Lorries and Trains by Sea

(From a Special Correspondent)

Handling costs add considerably to the price of any commodity and to effect sales these costs must be kept down to the lowest possible level. Through freight where individual items are loaded and do not require any subsequent handling until they are unloaded at their ultimate destination is a solution which many people are striving to attain. The use of containers, lorries, and railway wagons which can be carried by land and by sea is one solution to this problem, and the following examples show how American enterprise is dealing with the matter.

Container Service to Alaska

During the Second World War the United States of America found it imperative to build up the defence of Alaska and a great highway was constructed from Dawson Creek, British Columbia, to the Yukon, and thence via Whitehorse to Fairbanks in Alaska. By this route freight was carried to the fringe of the Arctic regions. In 1943 Alaska Freight Lines was formed to haul Army contract freight to and from Alaska over the new and treacherous Alcan Highway. This pioneering venture over one of the longest and most hazardous commercial motor routes in the world was developed into an all-the-year-round service. But with the advent of peace it was felt that the Alcan Highway left much to be desired and Alaska Freight Lines embarked upon a new project which



Alaska Freight Line Barge with Containers.

was to prove a more efficient and economical way of linking Alaska with the United States via Seattle and Tacoma.

The solution to the problems involved was found in the provision of a fast container service. Twice weekly Alaska Freight Line containers are loaded and sealed at consignors' warehouses and are not unlocked again until they arrive at Anchorage six days later or at Fairbanks a week later. At Seattle and Tacoma the containers and trailers are lifted by crane and placed on board one of a fleet of 204-ft. sea-going self-propelled barges or on to other barges which are towed by a fleet of ten " Niki Niki " tugs, and immediately set out on their 2,000 miles journey.

In Alaska dock facilities are maintained at both Anchorage and Seward. Anchorage serves as the primary Summer terminus, and Seward, which is open all the year round, is used during the winter months, thus assuring a continuous and uninterrupted service throughout the year. From Anchorage and Seward, Kenworth trucks, specially equipped for service in Alaska, deliver the freight via the Richardson Highway to Fairbanks and other towns and military installations.

Sixty specially built van and trailer units (either petrol or diesel engined) are used to collect and deliver goods for shipment in Seattle and Tacoma and to deliver them from the dockside to the consignee in Alaska. Smaller shipments are assembled for transfer to container vans by a fleet of 48 pick-up and miscellaneous trucks. Two hundred 40-ft. trailer vans and two hundred 30-ft. container vans are utilised in the truck and barge operation.

" Pool cars " for smaller mixed freight consignments are assembled at the loading docks in Seattle and Tacoma by smaller pick-up feeder vans. Perishable goods are carried in 4 Thermo King refrigerator units which maintain a controlled temperature ranging from 60° F. to 10° F. When placed on board the barges the refrigerator units are connected to the barges' self-contained generating sets. There is also a working arrangement with Allied Van Lines for the conveyance of household goods and furniture to and from the 48 States and Alaska. This door to door service is of particular use to the constantly changing military personnel.

The new container van system of fast through shipments is having a marked effect on Alaska's economy. For the first time in history food and produce now reach Alaska's grocers and military establishments in fresh condition. Builders and contractors are receiving on time materials and equipment they have ordered. The container service has eliminated costly handling and rehandling, excessive damage, and loss from pilferage.

Ferry Trains

For many years the inhabitants of Alaska have pleaded and agitated in vain for a railway to be built, via the Canadian coast, to connect them with the United States. This project has never held out prospects of being a commercial success owing to the sparsely settled areas of Canada through which the line would have to run, and the rigours of long winter blizzards. Instead of a railway line a freight train-ferry service has been inaugurated which connects Tacoma (Washington) with Paget Sound. All American railways are co-operating in the new venture and the Chicago-Milwaukee Railroad is providing the barges and the port terminal facilities at Tacoma. Loaded freight trains are run on board the large ferry barges which are then towed by " Miki-Miki " tugs to Alaska via the inshore route known as the Inside Passage. The Governor of Alaska said of this new venture, " This new line appears to me to be an excellent, cheap, and efficient method of transporting cargo to Alaska. I see it also as the beginning of what I have always felt must be developed between the States and Alaska. That is, a regular ferry service so that cars and trucks and even passengers can be transported directly to and from the territory."

The Alaska terminal of the new line is at Ward Cove, where the freight cars are transhipped to the shore rail connections with the 356 mile Alaska Railroad. For the first year of its operation the train ferry service was engaged in transporting machinery supplies and equipment to the big new pulp plant under construction near Ketchikan. After the mill is completed the line will bring chemicals and other supplies and return to the States with the finished products. Like the container service the major advantages are the elimination of stevedoring costs at both ends and the minimising of losses through damage and pilferage, by shipping in sealed cars.

Havana Train Ferry

Another American train-ferry service was inaugurated a few months ago between Port Everglades (Fla) and Havana (Cuba). This service is in substitution for a route which was at one time based on Key West until, a few years ago, the railway was destroyed by a hurricane. The service is operated by two ships of 3,000 G.R.T. each with a capacity of between 23 and 25 railway coaches and a speed of between 15 and 17 knots. The company operating this service has established its own train ferry dock, pier and warehouse at Hacendados, Havana.

Lorry Ferry

Based upon experience gained during the war years when tanks, guns and Army trucks were transported by landing craft, the McLean Trucking Company is proposing to build four large ships, each costing $5\frac{1}{2}$ million dollars, to carry loaded vehicles. It is proposed to operate a service between Wilmington (N.C.) in the south, and New York and Providence in the north, the ships making two or more round sailings each week. The Company claims that the ferry service will combine the economies of cheap water transport with the flexibility of a door to door vehicle service, and hopes to attract new traffic in building materials, petroleum products, low grade chemicals, paper, floor coverings, beverages, iron and steel. Each ship will carry 240 lorries and loading and unloading will be completed in four hours compared with 60 hours required for normally stowed cargo. The journey from Wilmington to New York will take 33 hours. Drivers will not accompany the lorries but will be available at both terminals.

Fire Training for Ships' Officers

Details of Liverpool Scheme

Believed to be the first of its kind in the country, a special section for the training of ships' officers and engineers in fire-fighting has been opened at the Liverpool Fire Authority's training school at Garston. The decision to form such a school was the outcome of recommendations made by the Chief Fire Officer for Liverpool, Mr. T. A. Kelly, after the fire which destroyed the "Empress of Canada" in January last year.

At a meeting at which the Mersey Docks and Harbour Board, shipowners and the chief officers of the Merseyside Fire Services were represented, it was unanimously agreed that the establishment of a training scheme in ship fire fighting and prevention was highly desirable, particularly for Merchant Navy officers.

In consequence, a three-day course has been mapped out, and it is hoped that a total of 2,000 men will be trained as the opportunity arises.

A steel training unit 30-ft. x 12-ft. x 20-ft. simulating a section of two decks of a ship complete with hatch covers, engine-room ladders, etc., has been made by Alfred Holt and Company, and presented to the school by the Liverpool Steam Ship Owners' Association. This unit will prove of great value in the training. Messrs. Alfred Holt have also presented two models of a cargo vessel and a passenger vessel in Perspex, capable of being loaded by lead weights or water to show the effects of water on stability, such as may be encountered during fire fighting operations.

The syllabus comprises the following subjects:—

Chemistry of combustion and principles of fire extinction; fire hazards on board ship and tactics employed in fire fighting; fixed fire fighting installations in ships; portable equipment used in fire fighting; fire prevention on vessels, both under normal sailing trim and on vessels under repair and overhaul conditions in dry and wet docks; ship stability in relation to fire fighting; and use and maintenance of breathing apparatus.

One of the points to be stressed throughout the course is that it is essential that the maximum co-operation between officers and the local fire services is assured at all times during an outbreak of fire in ships in port. It is also hoped that as a result of these courses, officers will be fully aware of the capabilities of the appliances aboard ship to deal with those fires which occur.

The course should give Merchant Navy and Fire Service officers a better appreciation of the difficulties experienced by both services when a fire does occur. The only direct expenditure likely to be involved in the scheme will be in respect of consumable items, e.g. foam, breathing apparatus, refills, etc., the cost of which is to be borne by the Liverpool Steam Ship Owners' Association.

Oil Pollution of the Sea

Shipboard Separator Plant to be Compulsory

The Oil in Navigable Waters Bill was read a first time in the House of Lords early this month. The object of this Bill is to enable effect to be given to the International Convention for the Prevention of Pollution of the Sea by Oil, and to provide other measures for avoiding oil pollution. It incorporates, with amendments, the main provisions of the Oil in Navigable Waters Act 1922.

It will be recalled that the Convention was prepared by the international conference which was held in London last May, when it was unanimously adopted by delegates from 40 countries, including the United Kingdom. (See the May 1954 issue of this Journal.)

The Convention fixed Zones in which the dumping of oil would be banned, separate zones being agreed for tankers and dry cargo ships. For tankers the general zone in which oil cannot be dumped is within 50 miles of any coast, except in special cases. In the North Sea the zone is 100 miles from any coast except that of Norway, for which it is 50 miles. For vessels other than tankers the 50 miles' limit applies in general. In the North Sea, however, the convention fixed the zone at a 100 miles from any coast except Norway, where the distance is 50 miles. In the Atlantic it is 100 miles west of any coast.

Briefly, the new Bill empowers the Minister to make regulations requiring British ships to be fitted with equipment for the prevention or reduction of oily discharges. The maximum penalty for an offence under the proposed legislation is to be a fine not exceeding £1,000.

The first clause of the Bill makes it an offence for the owner or the master of a ship registered in the United Kingdom to discharge oil from the ship into prohibited sea areas, or to allow it to escape. The oils specified are crude oil, fuel oil, lubricating oil, heavy diesel oil, and "any other description of oil which may be prescribed by the Minister."

Facilities to be Provided by Harbour Authorities

The Bill also gives powers to every harbour authority to provide facilities to enable vessels to discharge or deposit oil residues, and to make any necessary arrangements for the disposal of such residues. An authority may make reasonable charges for the use of oil reception facilities. The facilities are to be available to all vessels except tankers. If the Minister considers that any harbour authority's facilities are inadequate, or that a harbour having no facilities has need of them, he may direct the harbour authority to provide them. Fines may be imposed on an authority not complying with the Minister's directions.

Sweden's Plan for Implementing London Convention

The Swedish Harbours Association has informed the Swedish Board of Trade that Swedish ports are willing to undertake the measures for preventing the pollution of sea-water by oil recommended in the London Convention. The first stage will be the installation of oil separators on board ships; the provision by the oil companies of facilities for accepting oily residues at oil-loading ports, and the provision by shipyards of facilities for dealing with oily water and oil residues at ship-repairing ports. After this, it will be the duty of ports to provide facilities within three years which will enable dry-cargo vessels to dispose of water ballast and water used for tank washing which has traces of oil after passing through separators. The Association considers that Uddevalla, Gothenburg, Helsingborg, Landskrona, Malmö, Norrköping, Stockholm and Gefle should be regarded as ship-repairing ports for the above purposes. The Association has made inquiries at various ports as to measures which have been taken or planned, and from replies received it appears that some ports intend to provide barges to receive oily residues.

Improvement of Suez Canal

At a meeting held in Paris early this month, the Board of Directors of the Suez Canal Company approved the new programme of improvement works, which will cost about £7,500,000 and take three years to complete.

They constitute the first instalment of the eighth and largest programme of improvement since the canal was opened 85 years ago. The Board decided to commence the works at the beginning of 1955 because it has been found essential to modernise the canal to enable it to cope with the needs of continually increasing traffic. The plans had been submitted previously to the International Advisory Works Commission of the Company.

The main features of the new works will be:—

(a) The cutting of two by-passes to the east of the Canal, the first, more than 1¼ miles in length, at the southern end of Port Said; the second, nearly 2½ miles long, in the Bitter Lakes near El Kabrit.

(b) Widening the Canal over a length of 15 miles south of the Small Bitter Lake.

(c) Widening and deepening the Canal over more than 11 miles, at half distance, in the region of El Firdan. The widening of the canal is to take place in the two areas where the Canal cross section is the smallest.

No announcement has so far been made regarding the improvements to be included in subsequent instalments. The works now to be put in hand will provide better facilities for convoys to assemble and to pass one another.

Improvements at Port of London

Scheme for Surrey Commercial Docks

The Port of London Authority have decided to proceed with a scheme for widening the cutting between Greenland and Canada Docks in the Surrey Commercial Docks at an estimated cost of £365,000 as a step in the provision of additional berthing accommodation at these Docks for some of the larger vessels which are now restricted to using the Greenland Dock.

The present width of the cutting, which is 60-ft., will be increased to give an effective width of 80-ft. (i.e. the same as that at the Greenland Entrance Lock) by setting back the wall on the north side. The north-east corner of the cutting will be removed to facilitate the passage of ships. The widening will enable vessels 450-ft. in length with a draft of 25-ft. 6-in. to pass through the cutting into Canada Dock as compared with 420-ft. and 23-ft. 6-in. respectively at the present time. Vessels up to a maximum length of 440-ft. will also be able to proceed from Canada Dock through the Canada/Quebec cutting which is already 80-ft. wide.

A new single leaf rolling lift bridge will replace the existing swing bridge over the Cutting and this will benefit road traffic generally. It is estimated that the work will take over two years to complete.

There is a popular misconception that the Surrey Commercial Docks deal solely with ships carrying timber mainly from Baltic countries, but the Greenland Dock has always been used by ships discharging or loading general cargoes from and to various countries overseas. The new work now to be put in hand will eventually enable deep drafted vessels carrying general cargoes to berth also in the Canada and Quebec Docks.

For dealing with general cargo at the Greenland Docks, a new transit shed (No. 8), with an upper floor, 350-ft. long and 150-ft. wide, has been built on the south side at a cost of £170,000. The ground floor will allow cargo to be piled mechanically 20-ft. high and deliveries will be made by hoists from the upper floor. A unique feature of this new building, which will provide a berth for ships of the Scindia Line, is that there will be water access on both sides enabling cargo for sorting and craft delivery to be taken direct through the shed to the South Dock. Modern 3-ton electric luffing cranes will meet the discharging and loading needs on the Greenland Dock side.

On the opposite side of the Greenland-South Dock Cutting and within a few feet of the new No. 8 Shed is the recently built No. 2 Shed. Standing on a site previously occupied by a general warehouse this shed, which is 325-ft. long by 90-ft. wide, is devoted to immediate-delivery traffic from the Continent. At the west end of the Greenland Dock the work of rebuilding 12a Shed, similarly destroyed during the war, has now finished and this shed is mainly used for general cargo from Yugoslavian ships. In both these new sheds the roofs have been taken up to allow for high-piling of general cargo.

FOR SALE

FOR SALE—NEARLY NEW MOBILE CRANE, "Coles" Model S.25 (8506), "Hermes" full circle slewing, battery operated, with 15-ft. centres cantilever jib. Inspection King George V Dock. Write: Box No. R.711, c/o Streets, 110, Old Broad St., E.C.2.

2 No. Double Chain whole tine 40/35 Grabs available for immediate delivery ex. Makers works. Write Box No. 166, "Dock and Harbour Authority," 19, Harcourt Street, London, W.1.

Wanted :

Modern seagoing self-propelled

HOPPER BARGE, 600 c.y.

Write to Box No. 165, "The Dock and Harbour Authority," 19, Harcourt Street, London, W.1, England.

SITUATIONS VACANT

BLYTH HARBOUR COMMISSION.

ENGINEER.

Applications are invited for the position of ENGINEER to the BLYTH HARBOUR COMMISSION.

Candidates should be under 45 years of age and be fully qualified to take charge of the engineering work of a port and conservancy authority, including the design of new works, the maintenance of port installations and the control of workshops, dredging and traffic plant.

Commencing salary will be £1,650 per annum.

Applications, stating age, professional qualifications and experience, together with three references or copies of recent testimonials, should be addressed to me to arrive not later than 15th January, 1955.

The selected candidate will be required to pass a medical examination prior to appointment and to become a member of the Commissioners' contributory superannuation fund.

G. L. ATKINSON,
General Manager & Secretary.

Blyth,
Northumberland.

SHOREHAM HARBOUR TRUSTEES.

Applications are invited for the appointment of Clerk/Accountant.

Salary scale £1,000 x £100 to £1,400 p.a., commencing salary in accordance with qualifications and experience.

The successful applicant will be responsible for office administration, preparation of Board and Committee minutes and for all financial aspects of the Undertaking including the preparation of annual accounts and balance sheets, negotiations on financial matters with other Authorities, costing and budgetary control, and statistics.

Applicants should be qualified Accountants, preferably with secretarial experience.

The successful applicant will be required to commence his duties on or about 1st April, 1955, and the appointment will be subject to the conditions set out in the Particulars of Appointment. Medical examination and residence in neighbourhood required.

Forms of Application and Particulars of Appointment may be obtained from the undersigned and must be returned by 15th January, 1955.

Canvassing in any form will be a disqualification.

Harbour Office,
Southwick, Sussex.

A. G. STEPHENSON,
Clerk, Harbourmaster and Engineer.

TENDERS

CAERNARVON HARBOUR TRUST.

Tenders are invited for the complete removal of the wreck of the wooden vessel H.M.S. "Conway" as lying in "The Swellies," Menai Strait.

Further particulars and conditions can be obtained from the undersigned to whom complete tenders must be submitted not later than the 15th February, 1955.

The Harbour Trustees do not undertake to accept the lowest or any tender.

Harbour Office,
Caernarvon.

T. REES THOMAS,
Clerk and Superintendent.

TRADE MARKS

The Trade Marks set out below were assigned on 3rd November, 1954, by Gas Accumulator Company (United Kingdom) Limited of Beacon Works, Brentford, Middx., to Svenska Aktiebolaget Gasaccumulator of Lidingo, near Stockholm, Sweden, **without the goodwill of the business** in which they were then in use.

No.	Mark.	Goods.
340434	AGA	Dissolved acetylene gas.
340435	AGA	Signalling apparatus included in Class 8 used with acetylene gas.
543078	AGA	Railway signals, mechanism for operating flashing lights, mechanism for rotating the optical system of lighthouses and beacons, automatic incandescent mantle changing mechanism for lighthouses and beacons.
543079	AGA	Automatically operated flashing beacon lights for aircraft, ships or land vehicles; automatically operated traffic signals; light reflective signs or signals for road traffic; searchlights and lenses and optical apparatus (included in Class 8) for use in connection with any of the aforesaid goods, wind direction indicating instruments for aircraft, and sun valves, but not including lenses and optical apparatus for photographic purposes.
543080	AGA	Lanterns for marine and aerial beacons, and steel cylinders or accumulators for gas storage, all being metal goods not included in other classes.
543081	AGA	Engineering contrivances for housing installations for showing beacon lights to aircraft or ships, lighthouses, acetylene welding apparatus, and gas generating plant.
543082	AGA	Light buoys, marine beacons, marine sound signalling apparatus and marine fog signalling apparatus.